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(54) **DEVICES AND METHODS FOR TREATING THE SKIN USING A POROUS MEMBER**

(71) Applicant: **EDGE SYSTEMS LLC**, Signal Hill, CA (US)

(72) Inventors: **Roger Ignon**, Redondo Beach, CA (US); **Ed F. Nicolas**, Signal Hill, CA (US)

(73) Assignee: **Edge Systems LLC**, Long Beach, CA (US)

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(56) **References Cited**

U.S. PATENT DOCUMENTS

1,651,585 A 12/1927 Clair
2,608,032 A 8/1952 Garver
(Continued)

FOREIGN PATENT DOCUMENTS

AT 400 305 12/1995
AU 1 014 299 5/1999
(Continued)

OTHER PUBLICATIONS

Cox III et al., Decreased Splatter in Dermabrasion, Arch Facial Plastic Surgery, Jan.-Mar. 2000, vol. 2, pp. 23-26.

(Continued)

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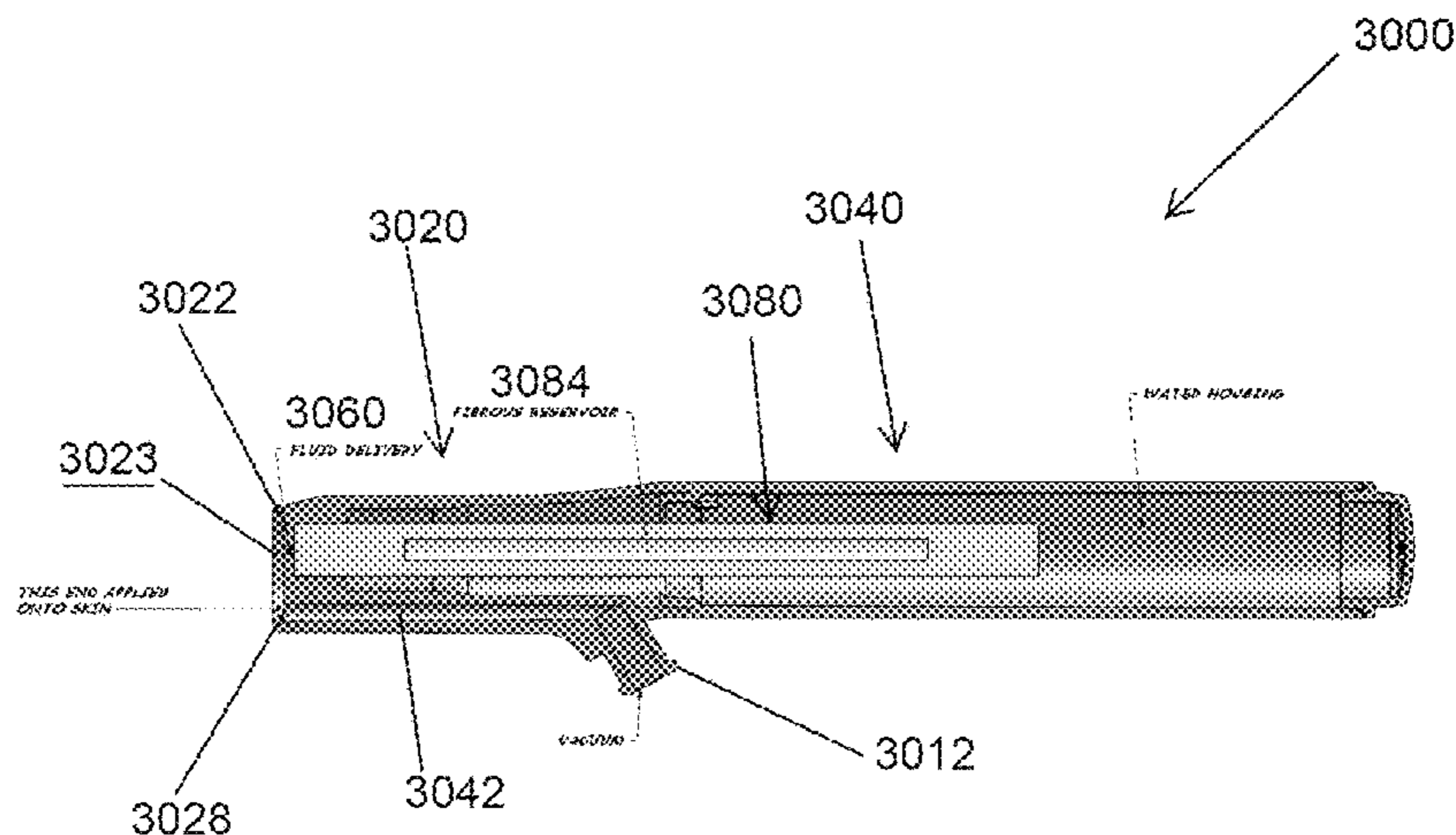
Assistant Examiner — Bradley Oliver

(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **ABSTRACT**

According to some embodiments, a skin treatment assembly comprises a tip comprising a proximal end and a distal end, a container configured to secure to the tip along the proximal end of the tip, wherein the container is configured to contain a liquid, and a porous member configured to extend at least partially within an interior of the container such that it contact a liquid contained within the container, wherein the porous member is configured to extend at least partially within an interior of the tip and is configured to facilitate the transfer of liquid from the container to the distal end of the tip.

20 Claims, 29 Drawing Sheets



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(56) **References Cited**

U.S. PATENT DOCUMENTS

2,631,583 A 3/1953 Lavergne
 2,701,559 A 2/1955 Cooper
 2,712,823 A 7/1955 Kurtin
 2,867,214 A 1/1959 Wilson
 2,881,763 A 4/1959 Robbins
 2,921,585 A 1/1960 Schumann
 3,037,509 A 6/1962 Schutz
 3,085,573 A 4/1963 Meyer et al.
 3,214,869 A 11/1965 Stryker
 3,468,079 A 9/1969 Kaufman
 3,476,112 A 11/1969 Elstein
 3,481,677 A * 12/1969 Abrahamson B43K 8/02
 401/131

3,505,993 A 4/1970 Lewes et al.
 3,574,239 A 4/1971 Sollerud
 3,715,838 A 2/1973 Young et al.
 3,865,352 A 2/1975 Nelson et al.
 3,866,264 A 2/1975 Engquist
 3,948,265 A 4/1976 Al Ani
 3,964,212 A 6/1976 Karden
 3,968,789 A 7/1976 Simoncini
 3,977,084 A 8/1976 Sloan
 4,121,388 A 10/1978 Wilson
 4,155,721 A 5/1979 Fletcher
 4,170,821 A 10/1979 Booth
 4,182,329 A 1/1980 Smit et al.
 4,203,431 A 5/1980 Abura et al.
 4,216,233 A 8/1980 Stein
 4,225,254 A 9/1980 Holberg et al.
 4,289,158 A 9/1981 Nehring
 4,299,219 A 11/1981 Norris, Jr.
 4,378,804 A 4/1983 Cortese
 4,560,373 A 12/1985 Sugino et al.
 4,646,480 A 3/1987 Williams
 4,646,482 A 3/1987 Chitjian
 4,655,743 A 4/1987 Hyde
 4,676,749 A 6/1987 Mabile
 4,706,676 A 11/1987 Peck
 4,718,467 A 1/1988 Di Gianfilippo et al.
 4,754,756 A 7/1988 Shelanski
 4,757,814 A 7/1988 Wang et al.
 4,764,362 A 8/1988 Barchas
 4,795,421 A 1/1989 Blasius, Jr. et al.
 4,811,734 A 3/1989 McGurk-Burleson et al.
 4,836,192 A 6/1989 Abbate

4,875,287 A 10/1989 Creasy et al.
 4,886,078 A 12/1989 Shiffman
 4,887,994 A 12/1989 Bedford
 4,900,316 A 2/1990 Yamamoto
 4,917,086 A 4/1990 Feltovich et al.
 4,925,450 A 5/1990 Imonti et al.
 4,957,747 A 9/1990 Stiefel
 5,006,004 A 4/1991 Dirksing et al.
 5,006,339 A 4/1991 Bargery et al.
 5,012,797 A 5/1991 Liang et al.
 5,035,089 A 7/1991 Tillman et al.
 5,037,431 A 8/1991 Summers et al.
 5,037,432 A 8/1991 Molinari
 5,054,339 A 10/1991 Yacowitz
 5,100,412 A 3/1992 Rosso
 5,100,424 A 3/1992 Jang
 5,119,839 A 6/1992 Rudolph
 5,122,153 A 6/1992 Harrel
 5,171,215 A 12/1992 Flanagan
 5,192,269 A 3/1993 Poli et al.
 5,207,234 A 5/1993 Rosso
 5,222,956 A 6/1993 Waldron
 5,242,433 A 9/1993 Smith et al.
 5,254,109 A 10/1993 Smith et al.
 5,368,581 A 11/1994 Smith et al.
 5,387,215 A 2/1995 Fisher
 5,391,151 A 2/1995 Wilmot
 5,417,674 A 5/1995 Smith et al.
 5,419,772 A 5/1995 Teitz et al.
 5,441,490 A 8/1995 Svedman
 5,460,620 A 10/1995 Smith et al.
 5,470,323 A 11/1995 Smith et al.
 5,484,427 A 1/1996 Gibbons
 5,490,736 A * 2/1996 Haber A61M 35/006
 401/132

5,512,044 A 4/1996 Duer
 5,562,642 A 10/1996 Smith et al.
 5,562,643 A 10/1996 Johnson
 5,611,687 A * 3/1997 Wagner A45D 34/041
 433/80

5,612,797 A 3/1997 Clarke
 5,674,235 A 10/1997 Parisi
 5,676,643 A 10/1997 Cann et al.
 5,676,648 A 10/1997 Henley
 5,683,971 A 11/1997 Rose et al.
 5,697,920 A 12/1997 Gibbons
 5,707,383 A 1/1998 Bays
 5,713,785 A 2/1998 Nishio
 5,735,833 A 4/1998 Olson
 5,759,185 A 6/1998 Grinberg
 5,762,640 A 6/1998 Kajiwara et al.
 5,779,519 A 7/1998 Oliver
 5,800,446 A 9/1998 Banuchi
 5,807,353 A 9/1998 Schmitz
 5,810,842 A 9/1998 Di Fiore et al.
 5,813,416 A 9/1998 Rudolph
 5,817,050 A 10/1998 Klein
 5,846,215 A 12/1998 Zygmont
 5,848,998 A 12/1998 Marasco, Jr.
 5,857,995 A 1/1999 Thomas et al.
 5,861,142 A 1/1999 Schick
 5,873,881 A 2/1999 McEwen et al.
 5,879,323 A 3/1999 Henley
 5,882,201 A 3/1999 Salem
 5,885,260 A 3/1999 Mehl, Sr. et al.
 5,908,401 A 6/1999 Henley
 5,919,152 A 7/1999 Zygmont
 5,954,730 A 9/1999 Bernabei
 5,971,999 A 10/1999 Naldoni
 5,980,555 A 11/1999 Barbut et al.
 6,019,749 A 2/2000 Fields et al.
 6,023,639 A 2/2000 Hakky et al.
 6,024,733 A 2/2000 Eggers et al.
 6,027,402 A 2/2000 Oliver
 6,039,745 A 3/2000 Di Fiore et al.
 6,042,552 A 3/2000 Cornier
 6,080,165 A 6/2000 DeJacma
 6,080,166 A 6/2000 McEwen et al.
 6,090,085 A 7/2000 Mehl, Sr. et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

| | | | | | | |
|--------------|---------|----------------------|-----------------|---------|-------------------|------------------------|
| | | | 6,905,487 B2 | 6/2005 | Zimmerman | |
| | | | 6,911,031 B2 | 6/2005 | Muldner | |
| | | | 6,926,681 B1 | 8/2005 | Ramey et al. | |
| | | | 6,942,649 B2* | 9/2005 | Ignon | A61B 17/545 604/289 |
| 6,120,512 A | 9/2000 | Bernabei | | | | |
| 6,129,701 A | 10/2000 | Cimino | 6,960,206 B2 | 11/2005 | Keane | |
| 6,136,008 A | 10/2000 | Becker et al. | 7,001,355 B2 | 2/2006 | Nunomura et al. | |
| 6,139,553 A | 10/2000 | Dotan | 7,004,933 B2 | 2/2006 | McDaniel | |
| 6,139,554 A | 10/2000 | Karkar et al. | 7,044,938 B2 | 5/2006 | La Bianco et al. | |
| 6,142,155 A | 11/2000 | Rudolph | 7,052,503 B2 | 5/2006 | Bernabei | |
| 6,149,634 A | 11/2000 | Bernabei | 7,069,073 B2 | 6/2006 | Henley et al. | |
| 6,159,226 A | 12/2000 | Kim | 7,070,488 B2 | 7/2006 | Suissa et al. | |
| 6,162,218 A | 12/2000 | Elbrecht et al. | 7,083,580 B2 | 8/2006 | Bernabei | |
| 6,162,232 A | 12/2000 | Shaddock | 7,087,063 B2 | 8/2006 | Carson et al. | |
| 6,165,059 A | 12/2000 | Parkin et al. | 7,094,252 B2 | 8/2006 | Koop | |
| 6,183,451 B1 | 2/2001 | Mehl, Sr. et al. | 7,115,275 B2 | 10/2006 | Clarot et al. | |
| 6,183,483 B1 | 2/2001 | Chang | 7,135,011 B2 | 11/2006 | Powers et al. | |
| 6,193,589 B1 | 2/2001 | Khalaj | 7,153,311 B2 | 12/2006 | Chung | |
| 6,196,982 B1 | 3/2001 | Ball | 7,197,359 B1 | 3/2007 | Tokudome et al. | |
| 6,231,593 B1 | 5/2001 | Meserol | 7,198,623 B2 | 4/2007 | Fischer et al. | |
| 6,235,039 B1 | 5/2001 | Parkin et al. | 7,232,444 B2 | 6/2007 | Chang | |
| 6,238,275 B1 | 5/2001 | Metcalf et al. | 7,241,208 B2 | 7/2007 | Suissa et al. | |
| 6,241,739 B1 | 6/2001 | Waldron | 7,276,051 B1 | 10/2007 | Henley et al. | |
| 6,264,666 B1 | 7/2001 | Coleman et al. | 7,293,930 B2 | 11/2007 | Chuang | |
| 6,277,128 B1 | 8/2001 | Muldner | 7,314,326 B2 | 1/2008 | Rosenberg | |
| 6,283,978 B1 | 9/2001 | Cheski et al. | 7,316,657 B2 | 1/2008 | Kleinhenz et al. | |
| 6,299,620 B1 | 10/2001 | Shaddock | 7,318,828 B1 | 1/2008 | Revivo | |
| 6,306,119 B1 | 10/2001 | Weber et al. | 7,320,691 B2 | 1/2008 | Pilcher et al. | |
| 6,306,147 B1 | 10/2001 | Bernabei et al. | 7,320,801 B2 | 1/2008 | Kelly | |
| 6,322,548 B1 | 11/2001 | Payne et al. | 7,354,423 B2 | 4/2008 | Zelickson et al. | |
| 6,322,568 B1 | 11/2001 | Bernabei et al. | 7,364,565 B2 | 4/2008 | Freeman | |
| 6,332,886 B1 | 12/2001 | Green et al. | 7,384,405 B2 | 6/2008 | Rhoades | |
| 6,368,333 B2 | 4/2002 | Bernabei et al. | 7,427,273 B2 | 9/2008 | Mitsui | |
| 6,387,103 B2 | 5/2002 | Shaddock | 7,458,944 B2 | 12/2008 | Liste et al. | |
| 6,401,289 B1 | 6/2002 | Herbert | 7,476,205 B2 | 1/2009 | Erdmann | |
| 6,409,736 B1 | 6/2002 | Bernabei | 7,477,938 B2 | 1/2009 | Sun et al. | |
| 6,410,599 B1 | 6/2002 | Johnson | 7,482,314 B2 | 1/2009 | Grimes et al. | |
| RE37,796 E | 7/2002 | Henley | 7,485,125 B2 | 2/2009 | Sjostrom | |
| 6,414,032 B1 | 7/2002 | Johnson | 7,489,989 B2 | 2/2009 | Sukhanov et al. | |
| 6,420,431 B1 | 7/2002 | Johnson | 7,507,228 B2 | 3/2009 | Sun et al. | |
| 6,423,078 B1 | 7/2002 | Bays et al. | 7,582,067 B2 | 9/2009 | Van Acker | |
| 6,423,750 B1 | 7/2002 | Johnson | 7,597,900 B2 | 10/2009 | Zimmer et al. | |
| 6,432,113 B1 | 8/2002 | Parkin et al. | 7,597,901 B2 | 10/2009 | Clarot et al. | |
| 6,432,114 B1 | 8/2002 | Rosso | 7,658,742 B2 | 2/2010 | Karasiuk | |
| 6,471,712 B2 | 10/2002 | Burres | 7,678,120 B2 | 3/2010 | Shaddock | |
| 6,477,410 B1 | 11/2002 | Henley et al. | 7,744,582 B2 | 6/2010 | Sadowski et al. | |
| 6,482,212 B1 | 11/2002 | Bernabei et al. | 7,789,886 B2 | 9/2010 | Shaddock | |
| 6,488,646 B1 | 12/2002 | Zygmunt | 7,837,695 B2 | 11/2010 | Hart et al. | |
| 6,494,856 B1 | 12/2002 | Zygmunt | 7,901,373 B2 | 3/2011 | Tavger | |
| 6,500,183 B1 | 12/2002 | Waldron | 7,951,156 B2 | 5/2011 | Karasiuk | |
| 6,503,256 B2 | 1/2003 | Parkin et al. | 7,993,333 B2 | 8/2011 | Oral et al. | |
| 6,511,486 B2 | 1/2003 | Mercier et al. | 8,025,669 B1 | 9/2011 | David et al. | |
| 6,514,262 B1 | 2/2003 | Di Fiore et al. | RE42,960 E | 11/2011 | Waldron | |
| 6,527,783 B1 | 3/2003 | Ignon | 8,048,089 B2* | 11/2011 | Ignon | A61B 17/545 606/1 |
| 6,535,761 B2 | 3/2003 | Bernabei | | | | |
| 6,540,757 B1 | 4/2003 | Hruska et al. | 8,066,716 B2 | 11/2011 | Shaddock | |
| 6,562,013 B1 | 5/2003 | Marasco, Jr. | 8,088,085 B2 | 1/2012 | Thiebaut et al. | |
| 6,562,050 B1 | 5/2003 | Owen | 8,105,295 B2 | 1/2012 | Blott et al. | |
| 6,564,093 B1 | 5/2003 | Ostrow et al. | 8,128,638 B2 | 3/2012 | Karasiuk et al. | |
| 6,565,535 B2 | 5/2003 | Zaias et al. | 8,221,437 B2 | 7/2012 | Waldron et al. | |
| 6,582,442 B2 | 6/2003 | Simon et al. | 8,236,008 B2 | 8/2012 | Boone, III et al. | |
| 6,589,218 B2 | 7/2003 | Garcia | 8,277,287 B2 | 10/2012 | Hart | |
| 6,592,595 B1 | 7/2003 | Mallett et al. | 8,337,513 B2 | 12/2012 | Shaddock | |
| 6,629,983 B1 | 10/2003 | Ignon | 8,343,116 B2 | 1/2013 | Ignon et al. | |
| 6,641,591 B1 | 11/2003 | Shaddock | 8,814,836 B2 | 8/2014 | Ignon et al. | |
| 6,645,184 B1 | 11/2003 | Zelickson et al. | 9,056,193 B2 | 6/2015 | Ignon et al. | |
| 6,652,888 B2 | 11/2003 | Rhoades | 9,468,464 B2 | 10/2016 | Shaddock | |
| 6,666,874 B2 | 12/2003 | Heitzmann et al. | 9,474,886 B2 | 10/2016 | Ignon et al. | |
| 6,673,081 B1 | 1/2004 | Tavger et al. | 9,486,615 B2 | 11/2016 | Ignon et al. | |
| 6,673,082 B2 | 1/2004 | Mallett et al. | 9,498,610 B2 | 11/2016 | Ignon et al. | |
| 6,685,853 B1 | 2/2004 | Angelopoulous et al. | 9,550,052 B2 | 1/2017 | Ignon et al. | |
| 6,687,537 B2 | 2/2004 | Bernabei | 9,566,088 B2 | 2/2017 | Ignon et al. | |
| 6,695,853 B2 | 2/2004 | Karasiuk | 9,642,997 B2 | 5/2017 | Ignon et al. | |
| 6,735,470 B2 | 5/2004 | Henley et al. | 9,662,482 B2 | 5/2017 | Ignon et al. | |
| 6,743,211 B1 | 6/2004 | Prausnitz et al. | 9,775,646 B2 | 10/2017 | Shaddock | |
| 6,743,215 B2 | 6/2004 | Bernabei | 9,814,868 B2 | 11/2017 | Ignon et al. | |
| 6,764,493 B1 | 7/2004 | Weber et al. | 2001/0023351 A1 | 9/2001 | Eilers | |
| 6,800,083 B2 | 10/2004 | Hiblar et al. | 2001/0037118 A1 | 11/2001 | Shaddock | |
| 6,869,611 B1 | 3/2005 | Kligman et al. | 2001/0049511 A1 | 12/2001 | Coleman et al. | |

(56)

References Cited

U.S. PATENT DOCUMENTS

2002/0016601 A1 2/2002 Shaddock
 2002/0041891 A1 4/2002 Cheski
 2002/0058952 A1 5/2002 Weber et al.
 2002/0107527 A1 8/2002 Burres
 2002/0128663 A1 9/2002 Mercier et al.
 2002/0133110 A1 9/2002 Citow
 2002/0133176 A1 9/2002 Parkin et al.
 2002/0151826 A1 10/2002 Ramey et al.
 2002/0151908 A1 10/2002 Mallett, Sr. et al.
 2002/0188261 A1 12/2002 Hruska
 2003/0012415 A1 1/2003 Cossel
 2003/0018252 A1 1/2003 Duchon et al.
 2003/0060834 A1 3/2003 Muldner
 2003/0093040 A1 5/2003 Mikszta et al.
 2003/0093089 A1 5/2003 Greenberg
 2003/0097139 A1 5/2003 Karasiuk
 2003/0167032 A1 9/2003 Ignon
 2003/0187462 A1 10/2003 Chang
 2003/0208159 A1 11/2003 Ignon et al.
 2003/0212127 A1 11/2003 Glassman et al.
 2003/0212415 A1 11/2003 Karasiuk
 2004/0010222 A1 1/2004 Nunomura et al.
 2004/0010269 A1 1/2004 Grimes et al.
 2004/0015139 A1 1/2004 La Bianco
 2004/0087972 A1 5/2004 Mulholland et al.
 2004/0092895 A1 5/2004 Harmon
 2004/0092959 A1 5/2004 Bernaz
 2004/0097967 A1 5/2004 Ignon
 2004/0122447 A1 6/2004 Harmon et al.
 2004/0127914 A1 7/2004 Chung
 2004/0143274 A1 7/2004 Shaddock
 2004/0162565 A1 8/2004 Carson et al.
 2004/0166172 A1 8/2004 Rosati et al.
 2004/0219179 A1 11/2004 McDaniel
 2004/0236291 A1 11/2004 Zelickson et al.
 2004/0243149 A1 12/2004 Lee, Jr.
 2004/0254587 A1 12/2004 Park
 2004/0267285 A1 12/2004 Chang
 2005/0037034 A1 2/2005 Rhoades
 2005/0038448 A1 2/2005 Chung
 2005/0059940 A1 3/2005 Weber et al.
 2005/0084509 A1 4/2005 Bernstein
 2005/0148958 A1 7/2005 Rucinski
 2005/0203111 A1 9/2005 David
 2005/0209611 A1 9/2005 Greenberg
 2005/0283176 A1 12/2005 Law
 2006/0002960 A1 1/2006 Zoetewij et al.
 2006/0116674 A1 6/2006 Goble et al.
 2006/0161178 A1 7/2006 Lee
 2006/0189964 A1 8/2006 Anderson
 2006/0191562 A1 8/2006 Numomura
 2006/0200099 A1 9/2006 La Bianco et al.
 2006/0200172 A1 9/2006 Shaddock
 2006/0200173 A1 9/2006 Shaddock
 2006/0212029 A1 9/2006 Villacampa et al.
 2006/0253125 A1 11/2006 Ignon
 2006/0264893 A1 11/2006 Sage, Jr. et al.
 2007/0005078 A1 1/2007 Hart et al.
 2007/0043382 A1 2/2007 Cheney
 2007/0065515 A1 3/2007 Key
 2007/0088371 A1 4/2007 Karasiuk
 2007/0123808 A1 5/2007 Rhoades
 2007/0154502 A1 7/2007 Hattendorf et al.
 2007/0156124 A1 7/2007 Ignon et al.
 2007/0178121 A1 8/2007 First et al.
 2007/0198031 A1 8/2007 Kellogg
 2007/0208353 A1 9/2007 Shaddock
 2007/0239173 A1 10/2007 Khalaj
 2008/0027328 A1 1/2008 Klopotek et al.
 2008/0091179 A1 4/2008 Durkin et al.
 2008/0103563 A1 5/2008 Powell
 2008/0119781 A1 5/2008 King
 2008/0132914 A1 6/2008 Bossard et al.
 2008/0139974 A1 6/2008 Da Silva
 2008/0154161 A1 6/2008 Abbott

2008/0193493 A1 8/2008 Rhoades
 2008/0200861 A1 8/2008 Shalev et al.
 2008/0208146 A1 8/2008 Brandwein et al.
 2008/0214987 A1 9/2008 Xu
 2008/0215068 A1 9/2008 Hart et al.
 2008/0221548 A1 9/2008 Danenberg et al.
 2008/0243039 A1 10/2008 Rhoades
 2008/0287864 A1 11/2008 Rosenberg
 2008/0300529 A1 12/2008 Reinstein
 2008/0300552 A1 12/2008 Cichocki et al.
 2009/0048557 A1 2/2009 Yeshurun et al.
 2009/0053390 A1 2/2009 Sakou et al.
 2009/0062815 A1 3/2009 Karasiuk et al.
 2009/0099091 A1 4/2009 Hantash
 2009/0099093 A1 4/2009 Hantash
 2009/0124985 A1 5/2009 Hasenoehrl et al.
 2009/0138026 A1 5/2009 Wu
 2009/0177171 A1 7/2009 Ignon et al.
 2009/0192442 A1 7/2009 Ignon et al.
 2009/0222023 A1 9/2009 Boone, III et al.
 2010/0045427 A1 2/2010 Boone, III et al.
 2010/0049177 A1 2/2010 Boone, III et al.
 2010/0049210 A1 2/2010 Boone, III et al.
 2010/0217357 A1 8/2010 Da Silva
 2010/0305495 A1 12/2010 Anderson et al.
 2011/0054490 A1 3/2011 Hart
 2011/0066162 A1 3/2011 Cohen
 2011/0082415 A1 4/2011 Ignon et al.
 2012/0022435 A1 1/2012 Ignon et al.
 2012/0041338 A1 2/2012 Chickering, III et al.
 2012/0136374 A1 5/2012 Karasiuk
 2013/0004230 A1* 1/2013 Kirk, III A45D 34/04
 401/132
 2013/0018317 A1 1/2013 Bobroff et al.
 2013/0066336 A1 3/2013 Boone, III et al.
 2013/0096577 A1 4/2013 Shaddock
 2013/0102978 A1 4/2013 Ignon et al.
 2013/0144280 A1 6/2013 Eckhouse et al.
 2013/0158547 A1 6/2013 David
 2014/0343481 A1 11/2014 Ignon
 2014/0343574 A1 11/2014 Ignon et al.
 2015/0032047 A1 1/2015 Ignon et al.
 2015/0230824 A1 8/2015 Shaddock
 2015/0230825 A1 8/2015 Shaddock
 2015/0231379 A1 8/2015 Ignon et al.
 2015/0265822 A1 9/2015 Ignon et al.
 2015/0272623 A1 10/2015 Ignon et al.
 2015/0290442 A1 10/2015 Ignon et al.
 2016/0038183 A1 2/2016 Ignon et al.
 2017/0036002 A1 2/2017 Ignon et al.
 2017/0065801 A1 3/2017 Ignon et al.
 2017/0209894 A1* 7/2017 Sporrer A45D 34/042
 2017/0224972 A1 8/2017 Ignon et al.
 2017/0245876 A1 8/2017 Ignon et al.
 2017/0266424 A1 9/2017 Ignon et al.
 2017/0319835 A1 11/2017 Ignon et al.
 2017/0319836 A1 11/2017 Ignon et al.
 2017/0333689 A1 11/2017 Ignon et al.

FOREIGN PATENT DOCUMENTS

CA 2 340 154 9/2002
 DE 59 95 21 7/1934
 DE 24 15 633 10/1975
 DE 33 38 057 8/1984
 DE 34 21 390 12/1985
 DE 234 608 4/1986
 DE 35 03 343 8/1986
 DE 83 30 191 6/1987
 DE 37 40 902 12/1988
 DE 42 37 940 5/1993
 DE 298 08 395 8/1998
 DE 10 2004 015815 11/2005
 EP 0 258 901 9/1987
 EP 0 564 392 3/1993
 EP 0 784 997 7/1997
 EP 2106780 3/2016
 ES 1 037 776 4/1998
 FR 2 712 172 5/1995

(56)

References Cited

FOREIGN PATENT DOCUMENTS

| | | |
|----|----------------|---------|
| FR | 2 773 461 | 7/1999 |
| GB | 1 372 609 | 10/1974 |
| GB | 2306351 | 5/1997 |
| IT | 553 076 | 12/1956 |
| IT | 118 49 22 | 3/1985 |
| JP | 1993-088552 | 12/1993 |
| JP | 1997-294747 | 11/1997 |
| JP | 2003-534881 | 11/2003 |
| JP | 2003-339713 | 12/2003 |
| JP | 2004-275721 | 10/2004 |
| JP | 2006-503627 | 2/2006 |
| JP | 2006-204767 | 10/2006 |
| KR | 20-0280320 | 7/2002 |
| KR | 10-20070070173 | 7/2007 |
| WO | WO 1994/024980 | 11/1994 |
| WO | WO 1997/011650 | 3/1997 |
| WO | WO 2000/015300 | 3/2000 |
| WO | WO 2001/93931 | 12/2001 |
| WO | WO 2003/073917 | 9/2003 |
| WO | WO 2004/037098 | 5/2004 |
| WO | WO 2005/070313 | 8/2005 |
| WO | WO 2006/018731 | 2/2006 |
| WO | WO 2006/031413 | 3/2006 |
| WO | WO 2007/114904 | 10/2007 |
| WO | WO 2009/088884 | 7/2009 |
| WO | WO 2009/097451 | 8/2009 |
| WO | WO 2012/145667 | 10/2012 |

OTHER PUBLICATIONS

Ditre et al., Effect of α -hydroxy acids on photoaged skin: A pilot clinical, histologic, and ultrastructural study, *Journal of American Academy of Dermatology*, Feb. 1996, vol. 34, No. 2, Part 1, pp. 187-195.

Harris et al., Combining Manual Dermabrasion with Low Strength Trichloroacetic Acid to Improve Antinically Injured Skin, *The Journal of Dermatologic Surgery and Oncology*, Jul. 1994, vol. 20, No. 7, pp. 436-442.

International Search Report for related PCT App. No. PCT/US2015/067531, dated Mar. 11, 2016.

U.S. Appl. No. 09/648,025 (U.S. Pat. No. 6,641,591), filed Aug. 25, 2000, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 10/699,747 (U.S. Pat. No. 7,789,886), filed Nov. 3, 2003, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 11/739,615 (U.S. Pat. No. 8,337,513), filed Apr. 24, 2007, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 11/417,709 (U.S. Pat. No. 8,066,716), filed May 3, 2006, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 11/417,396 (U.S. Pat. No. 7,678,120), filed May 3, 2006, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 13/620,164, filed Sep. 14, 2012, Instruments and Techniques for Controlled Removal of Epidermal Layers.

U.S. Appl. No. 14/702,509, filed May 1, 2015, Devices and Systems for Treating the Skin Using Vacuum.

U.S. Appl. No. 14/702,486 (U.S. Pat. No. 9,468,464), filed May 1, 2015, Methods for Treating the Skin Using Vacuum.

U.S. Appl. No. 11/392,348 (U.S. Pat. No. 8,048,089), filed Mar. 29, 2006, Apparatus and Methods for Treating the Skin.

U.S. Appl. No. 13/267,554 (U.S. Pat. No. 9,474,886), filed Oct. 6, 2011, Removable Tips for Skin Treatment Systems.

U.S. Appl. No. 14/698,673 (U.S. Pat. No. 9,550,052), filed Apr. 28, 2015, Console System for the Treatment of Skin.

U.S. Appl. No. 14/698,713 (U.S. Pat. No. 9,662,482), filed Apr. 28, 2015, Methods and Systems for Extraction of Materials From Skin.

U.S. Appl. No. 14/700,789, filed Apr. 30, 2015, Tip With Embedded Materials for Skin Treatment.

U.S. Appl. No. 15/660,750, filed Jul. 26, 2017, Tips for Skin Treatment Device.

U.S. Appl. No. 15/660,777, filed Jul. 26, 2017, Removable Tips for Use With Skin Treatment Systems.

U.S. Appl. No. 09/294,254 (U.S. Pat. No. 6,162,232), filed Apr. 19, 1999, Instruments and Techniques for High-Velocity Fluid Abrasion of Epidermal Layers With Skin Cooling.

U.S. Appl. No. 09/475,480 (U.S. Pat. No. 6,299,620), filed Dec. 30, 1999, Instruments and Techniques for Inducing Neocollagenesis in Skin Treatments.

U.S. Appl. No. 09/475,479 (U.S. Pat. No. 6,387,103), filed Dec. 30, 1999, Instruments and Techniques for Inducing Neocollagenesis in Skin Treatments.

U.S. Appl. No. 11/370,200, filed Mar. 7, 2006, Microdermabrasion Method and Apparatus.

U.S. Appl. No. 12/362,353 (U.S. Pat. No. 9,056,193), filed Jan. 29, 2009, Apparatus and Method for Treating the Skin.

U.S. Appl. No. 14/734,995, filed Jun. 9, 2015, Devices and Systems for Treating Skin Surfaces.

U.S. Appl. No. 12/832,663 (U.S. Pat. No. 8,814,836), filed Jul. 8, 2010, Devices, Systems and Methods for Treating the Skin Using Time-Release Substances.

U.S. Appl. No. 14/455,762 (U.S. Pat. No. 9,642,997), filed Aug. 8, 2014, Devices for Treating Skin Using Treatment Materials Located Along a Tip.

U.S. Appl. No. 15/588,102, filed May 5, 2017, Devices for Treating Skin Using Treatment Materials Located Along a Tip.

U.S. Appl. No. 12/346,582 (U.S. Pat. No. 8,343,116), filed Dec. 30, 2008, Apparatus and Method for Treating the Skin.

U.S. Appl. No. 13/620,376 (U.S. Pat. No. 9,486,615), filed Sep. 14, 2012, Microdermabrasion Apparatus and Method.

U.S. Appl. No. 15/344,357, filed Nov. 4, 2016, Devices and Methods for Skin Treatment.

U.S. Appl. No. 09/540,945 (U.S. Pat. No. 6,592,595), filed Mar. 31, 2000, Microdermabrasion and Suction Massage Apparatus and Method.

U.S. Appl. No. 09/698,409 (U.S. Pat. No. 6,527,783), filed Oct. 27, 2000, Microdermabrasion and Suction Massage Apparatus and Method.

U.S. Appl. No. 10/177,173 (U.S. Pat. No. 6,673,082), filed Jun. 20, 2002, Microdermabrasion Handpiece With Supply and Return Lumens.

U.S. Appl. No. 10/315,478 (U.S. Pat. No. 6,942,649), filed Dec. 10, 2002, Microdermabrasion Fluid Application System and Method.

U.S. Appl. No. 09/699,220 (U.S. Pat. No. 6,629,983), filed Oct. 27, 2000, Apparatus and Method for Skin/Surface Abrasion.

U.S. Appl. No. 14/211,089, filed Mar. 14, 2014, Skin Treatment Systems and Methods Using Needles.

U.S. Appl. No. 14/211,290 (U.S. Pat. No. 9,566,088), filed Mar. 14, 2014, Devices, Systems and Methods for Treating the Skin.

U.S. Appl. No. 15/430,209, filed Feb. 10, 2017, Devices, Systems and Methods for Treating the Skin.

U.S. Appl. No. 14/774,641, filed Sep. 10, 2015, Devices, Systems and Methods for Treating the Skin.

U.S. Appl. No. 14/998,375 (U.S. Pat. No. 9,498,610), filed Dec. 23, 2015, Devices and Methods for Treating the Skin Using a Rollerball or a Wicking Member.

U.S. Appl. No. 15/354,754, filed Nov. 17, 2016, Devices and Methods for Treating the Skin.

U.S. Appl. No. 15/204,939, filed Jul. 7, 2016, Devices, Systems and Methods for Promoting Hair Growth.

* cited by examiner

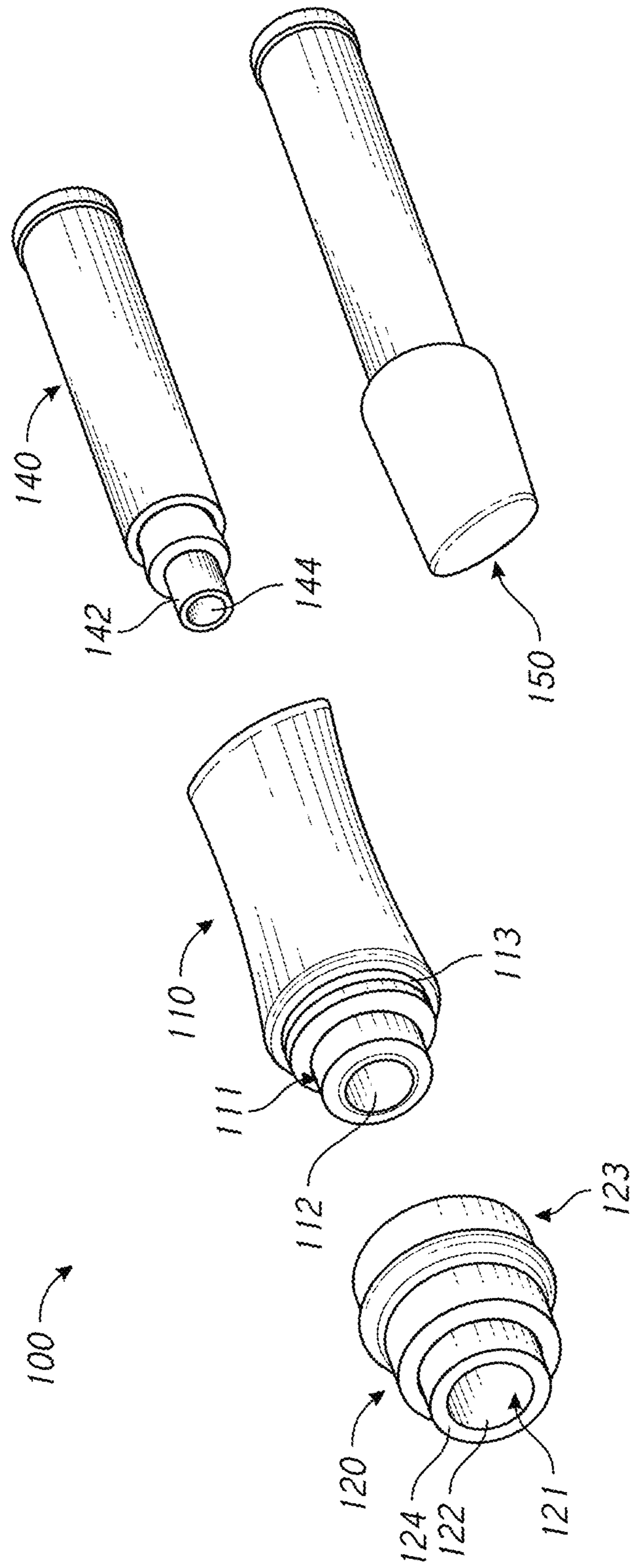


FIG. 1

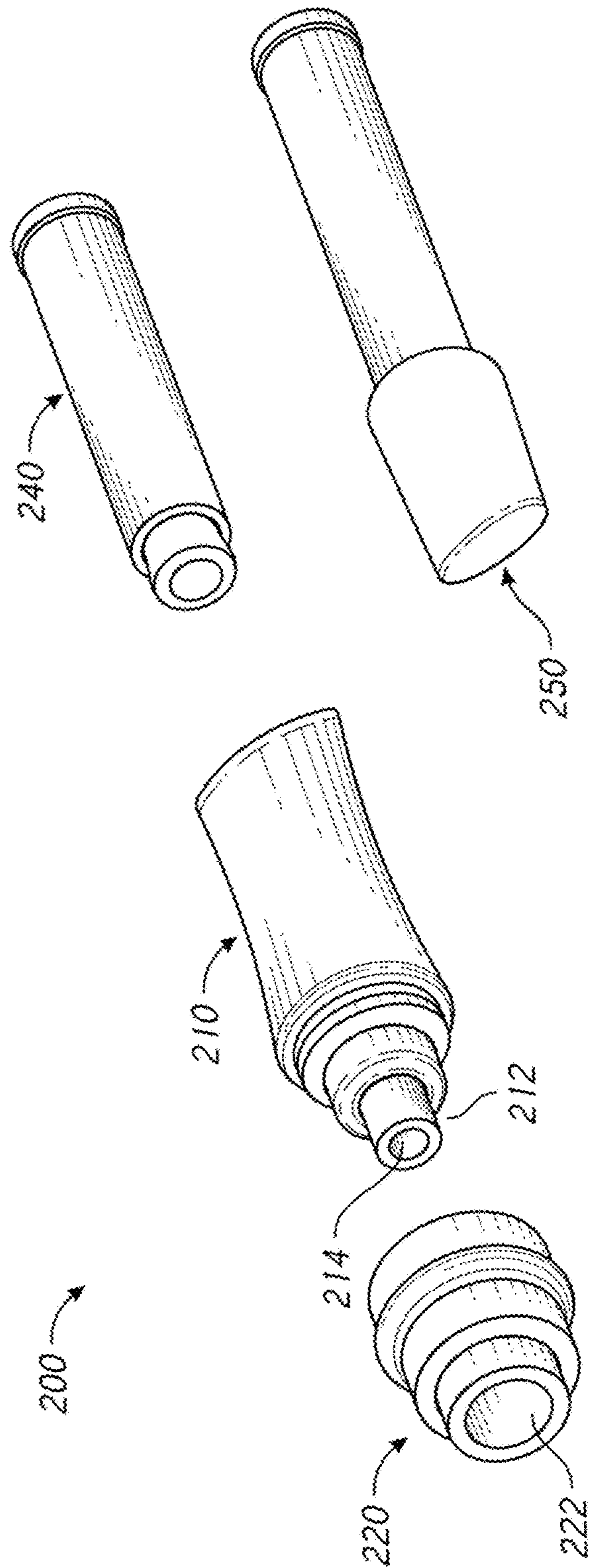


FIG. 2

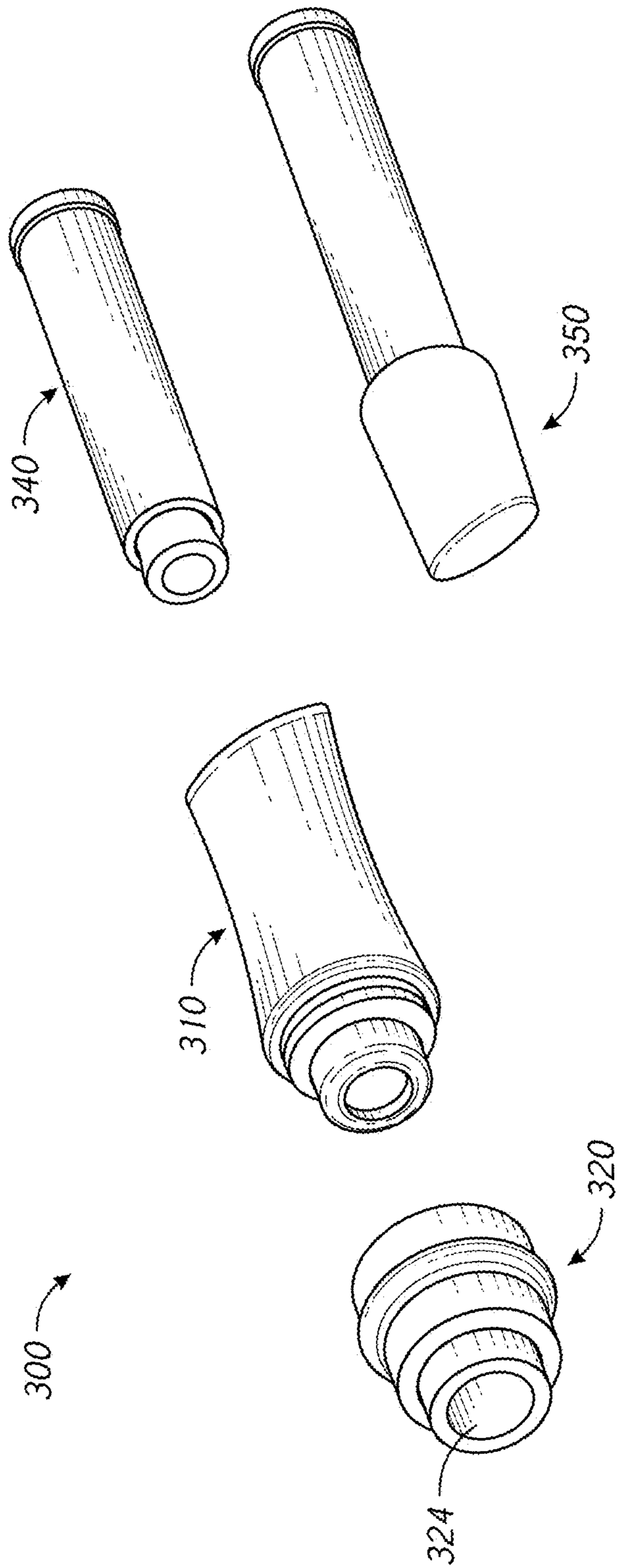


FIG. 3

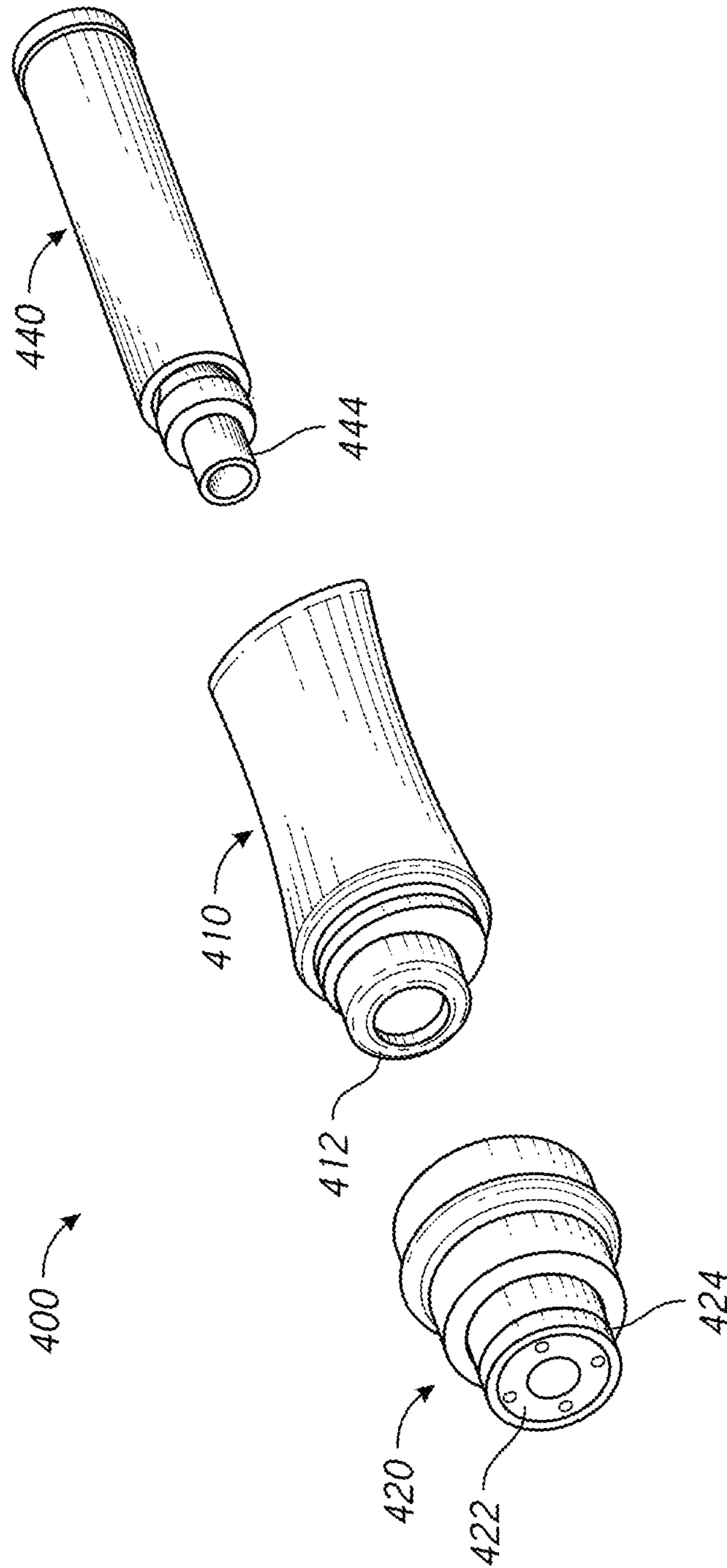


FIG. 4

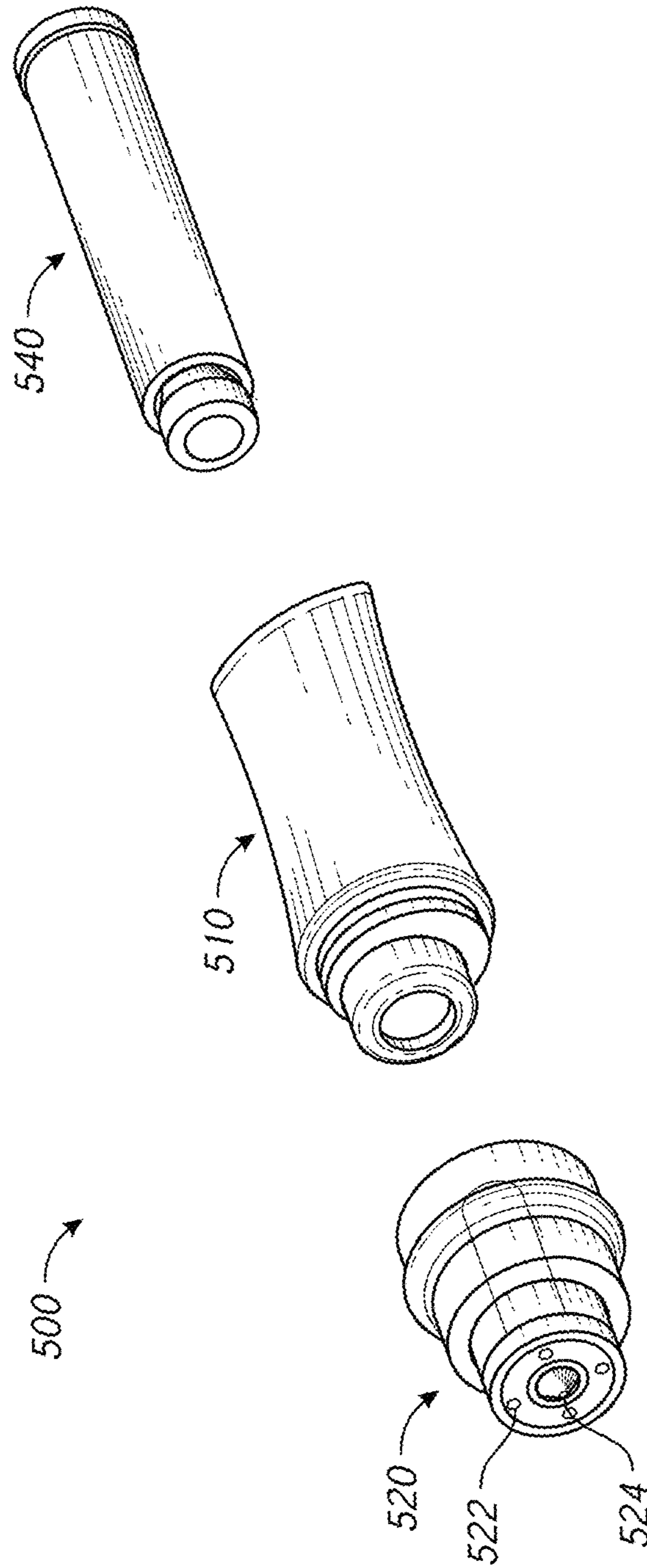


FIG. 5

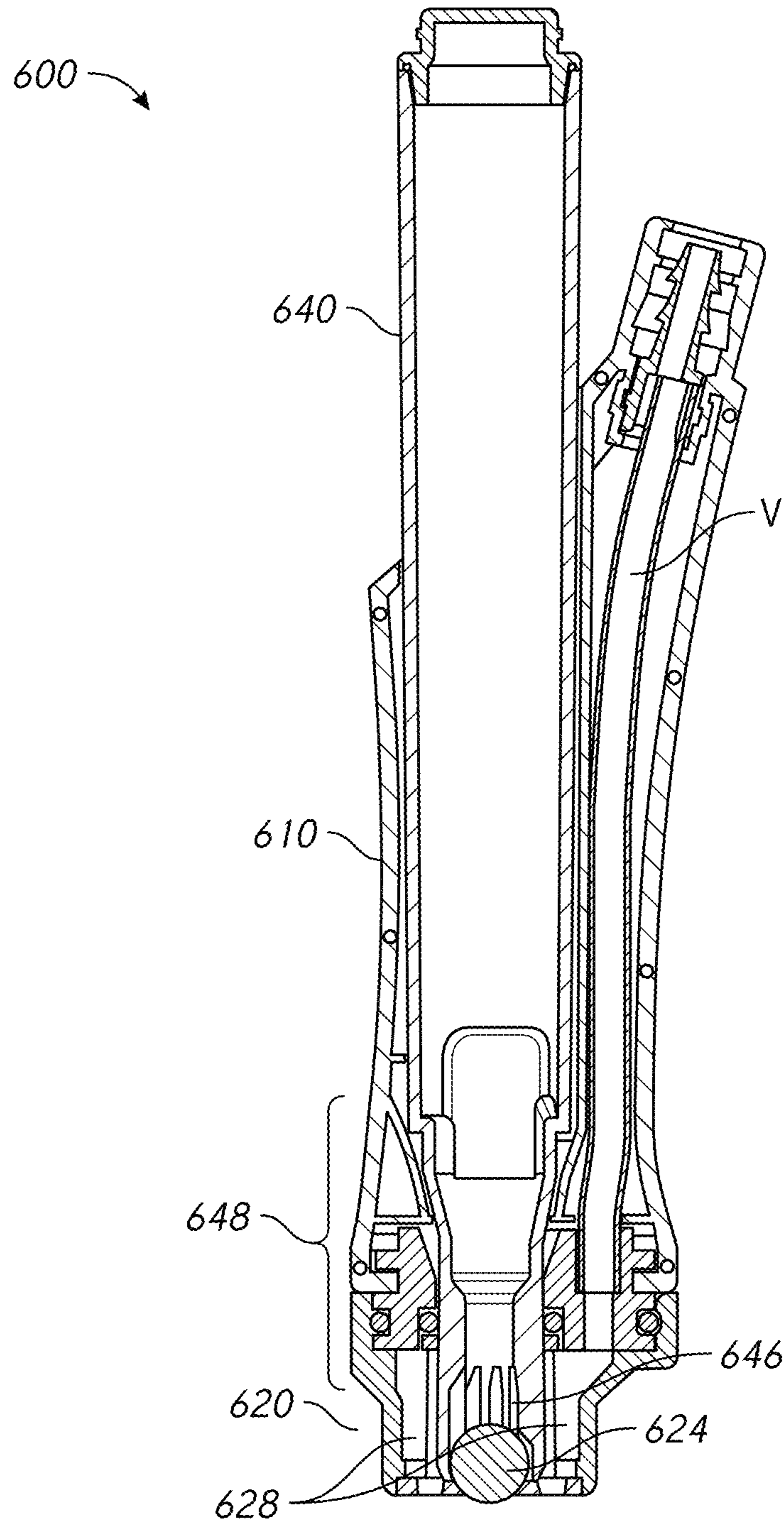


FIG. 6A

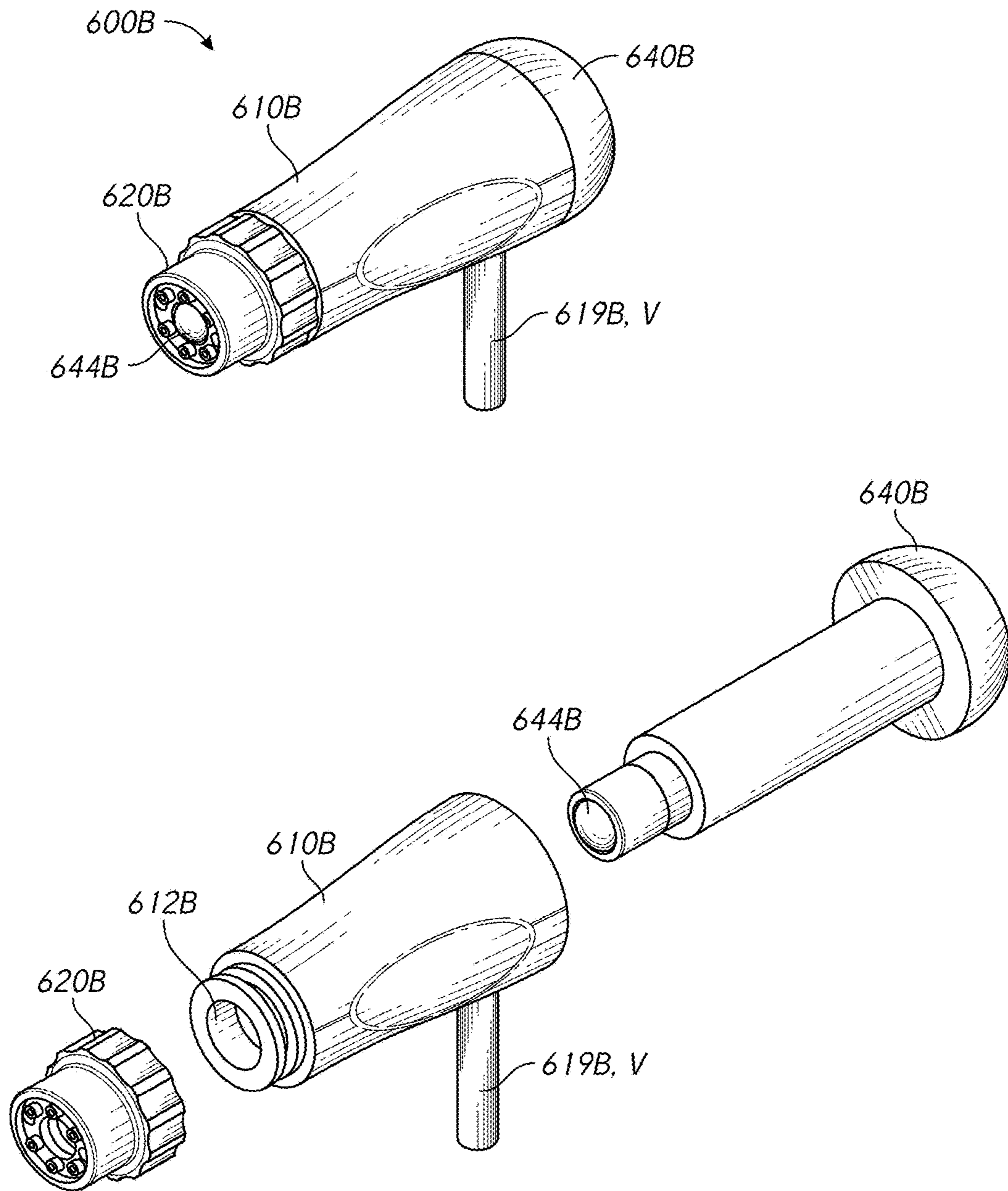


FIG. 6B

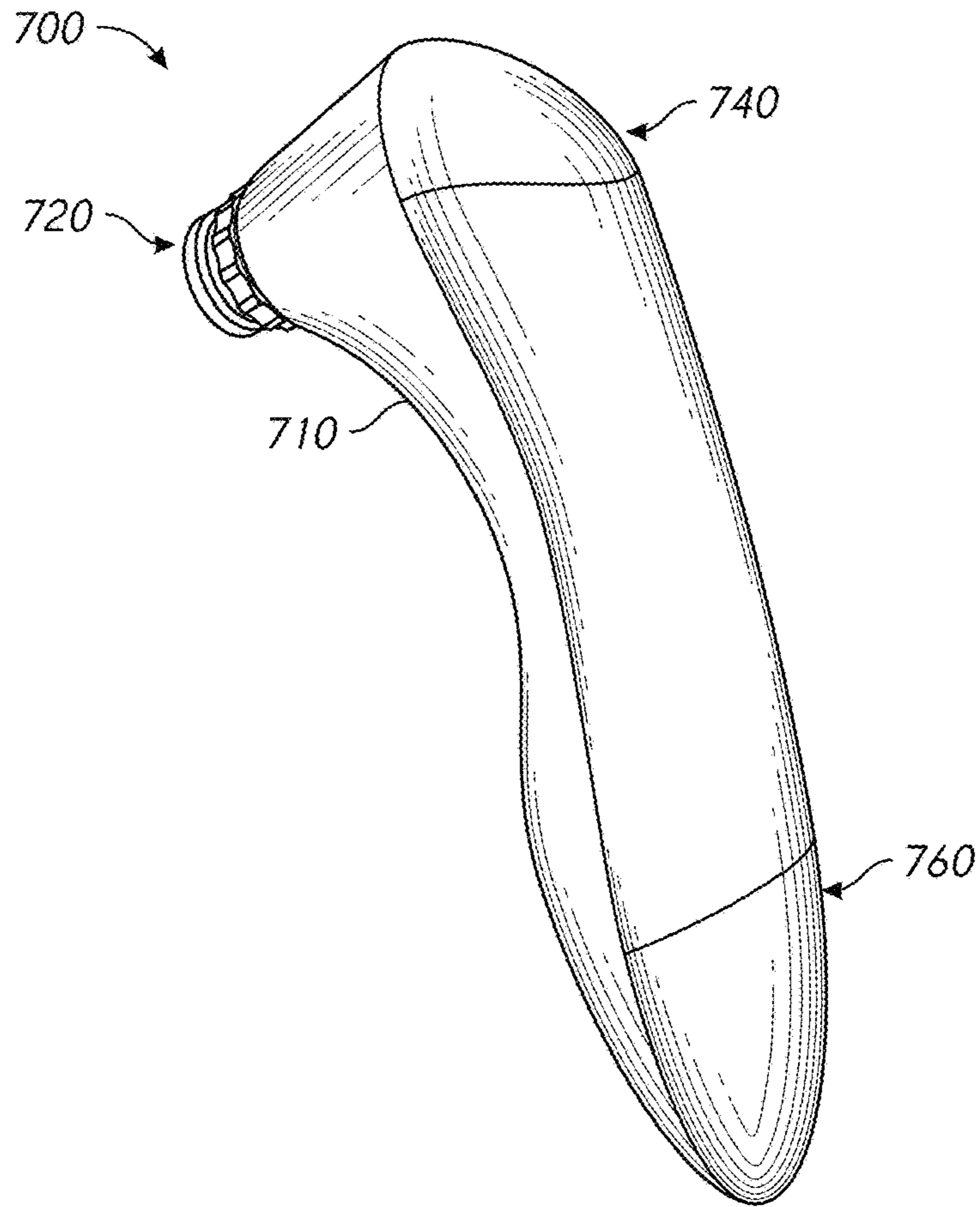


FIG. 7

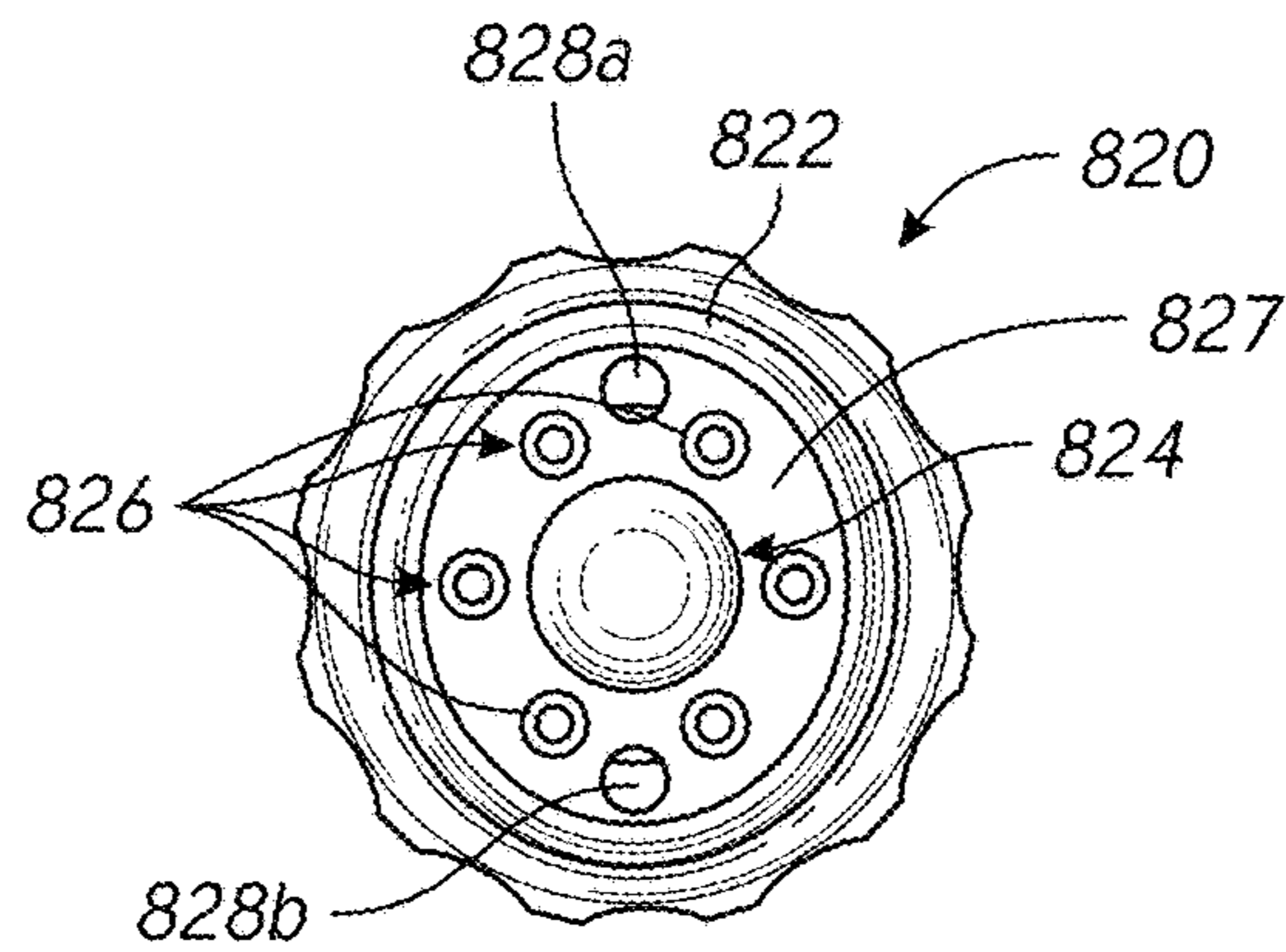


FIG. 8

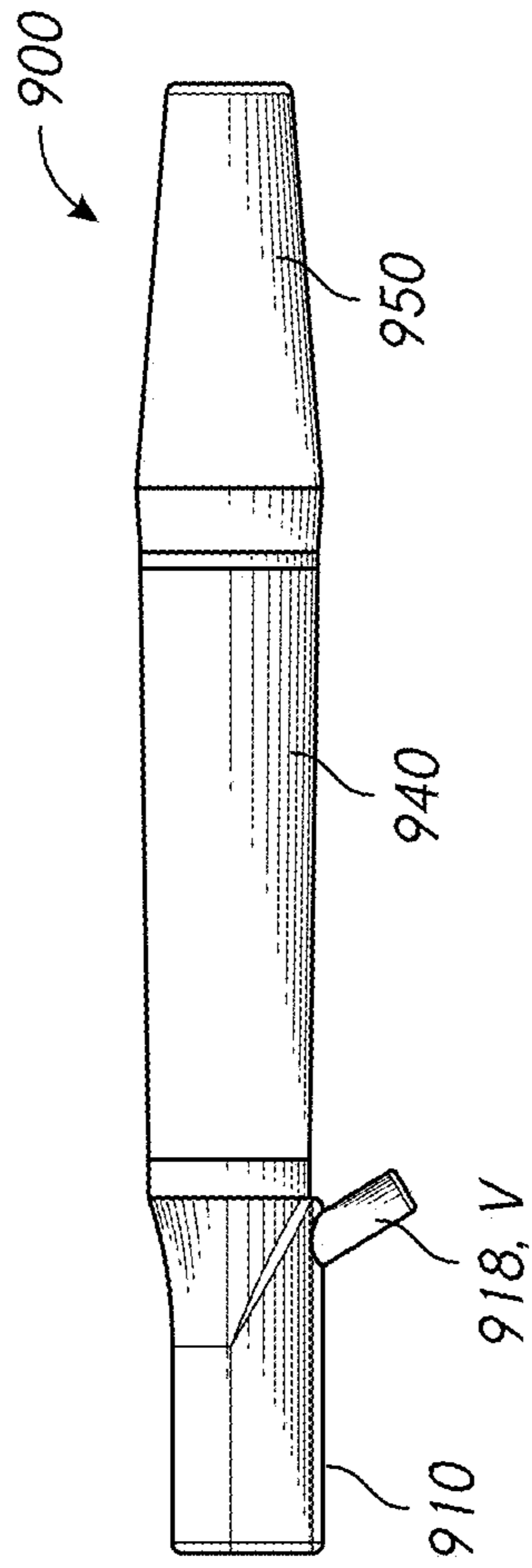


FIG. 9A

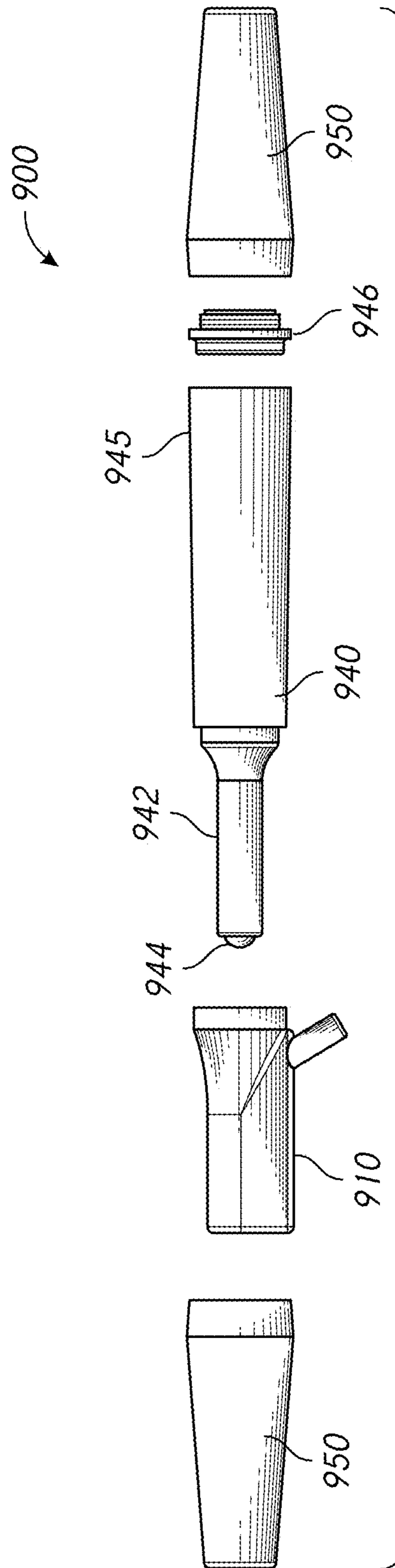


FIG. 9B

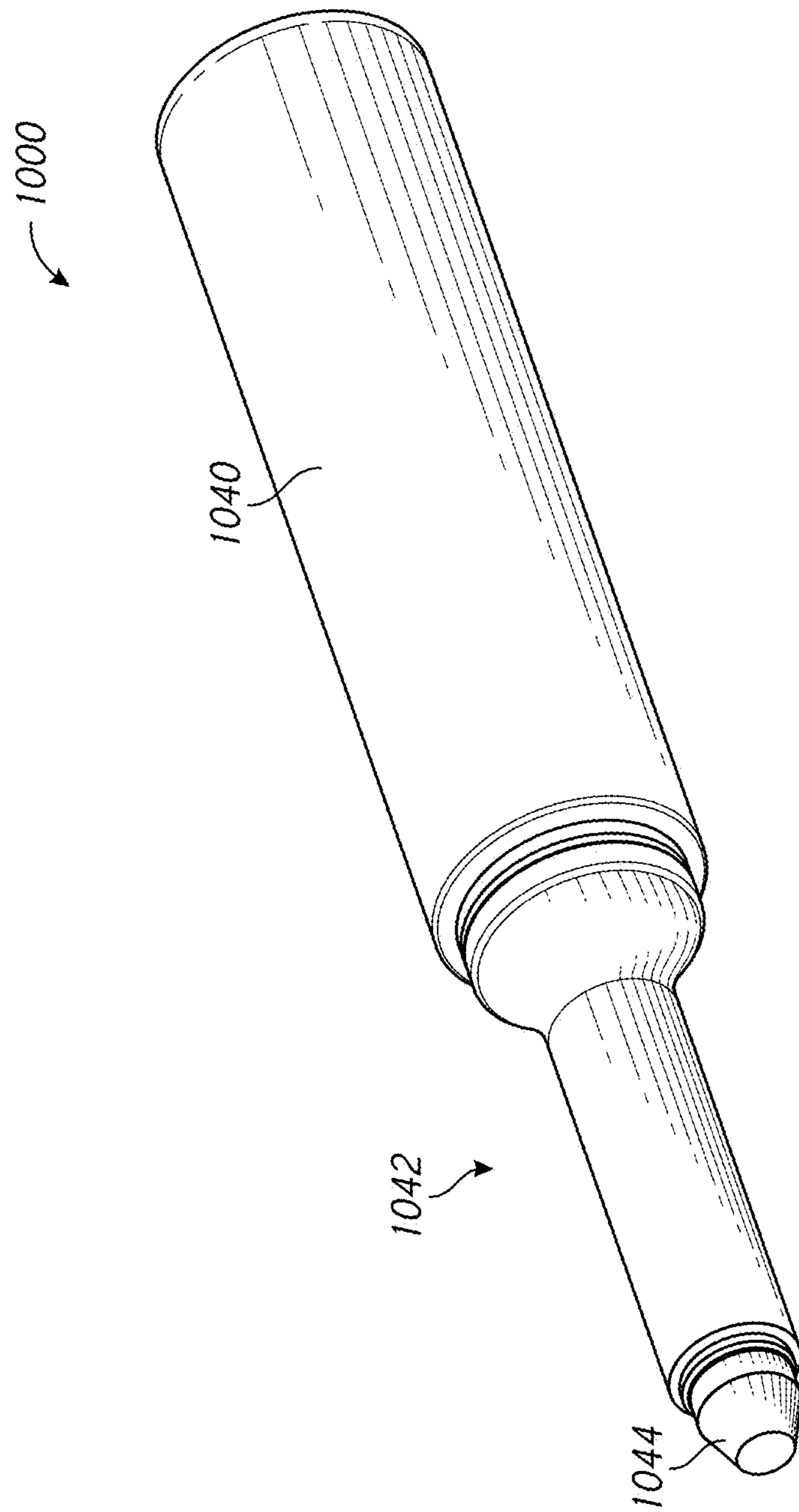


FIG. 10

1000 →

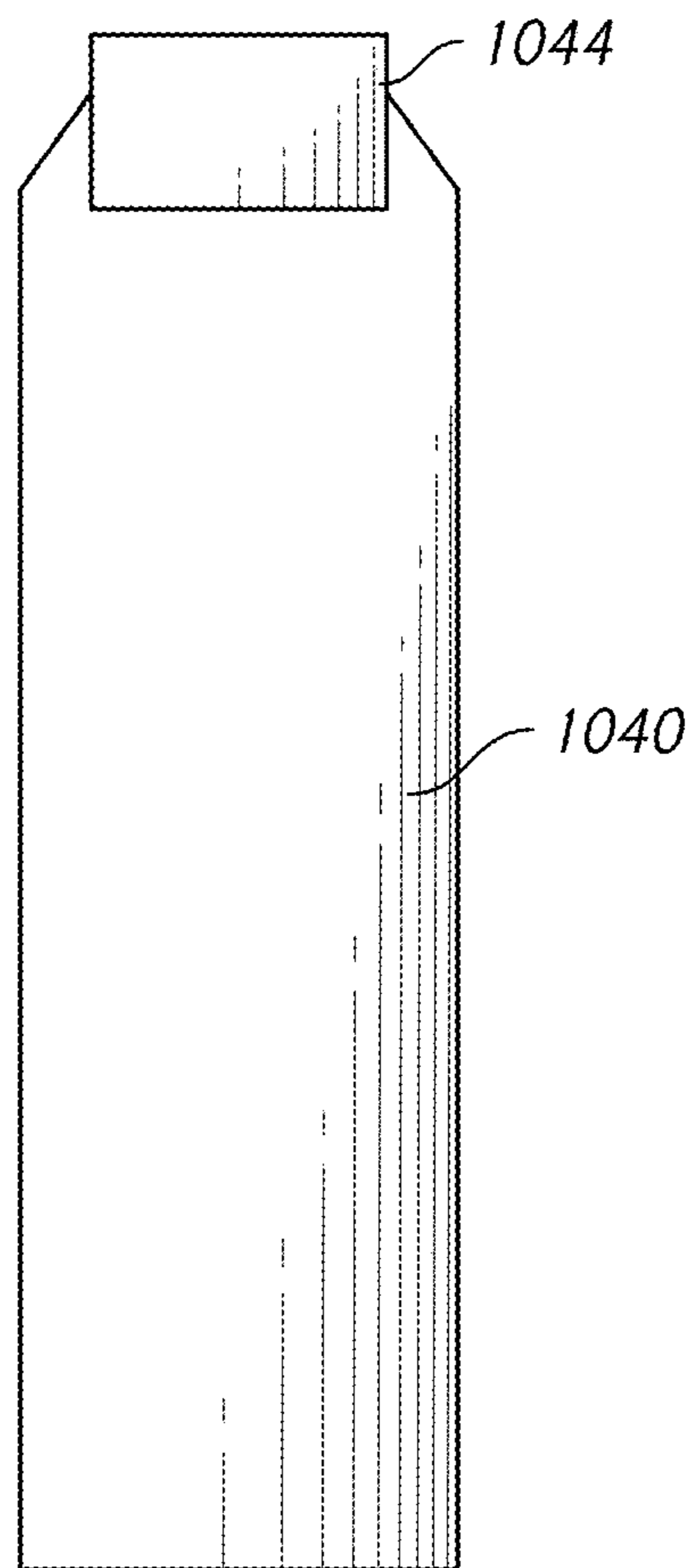


FIG. 11

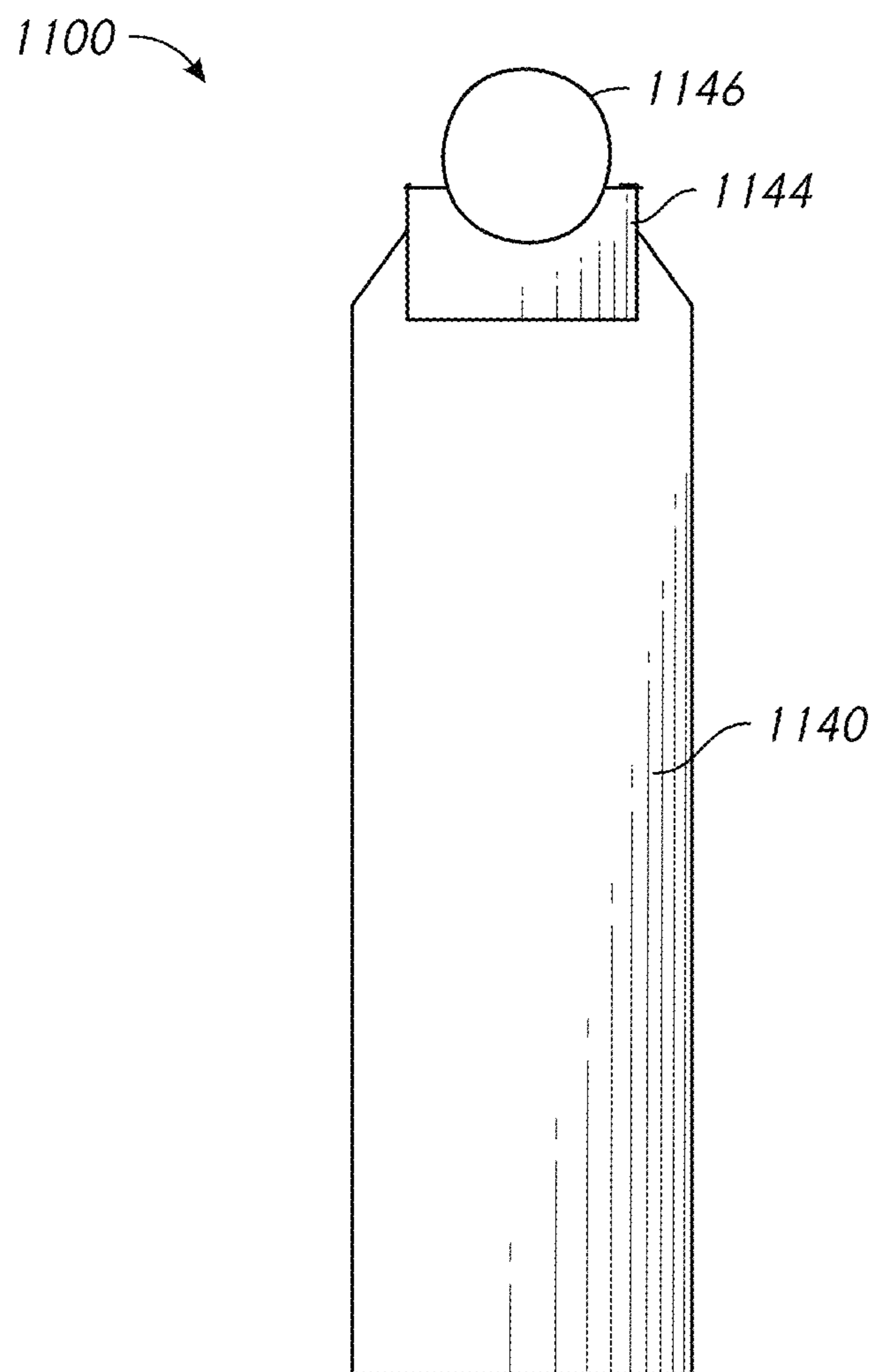


FIG. 12

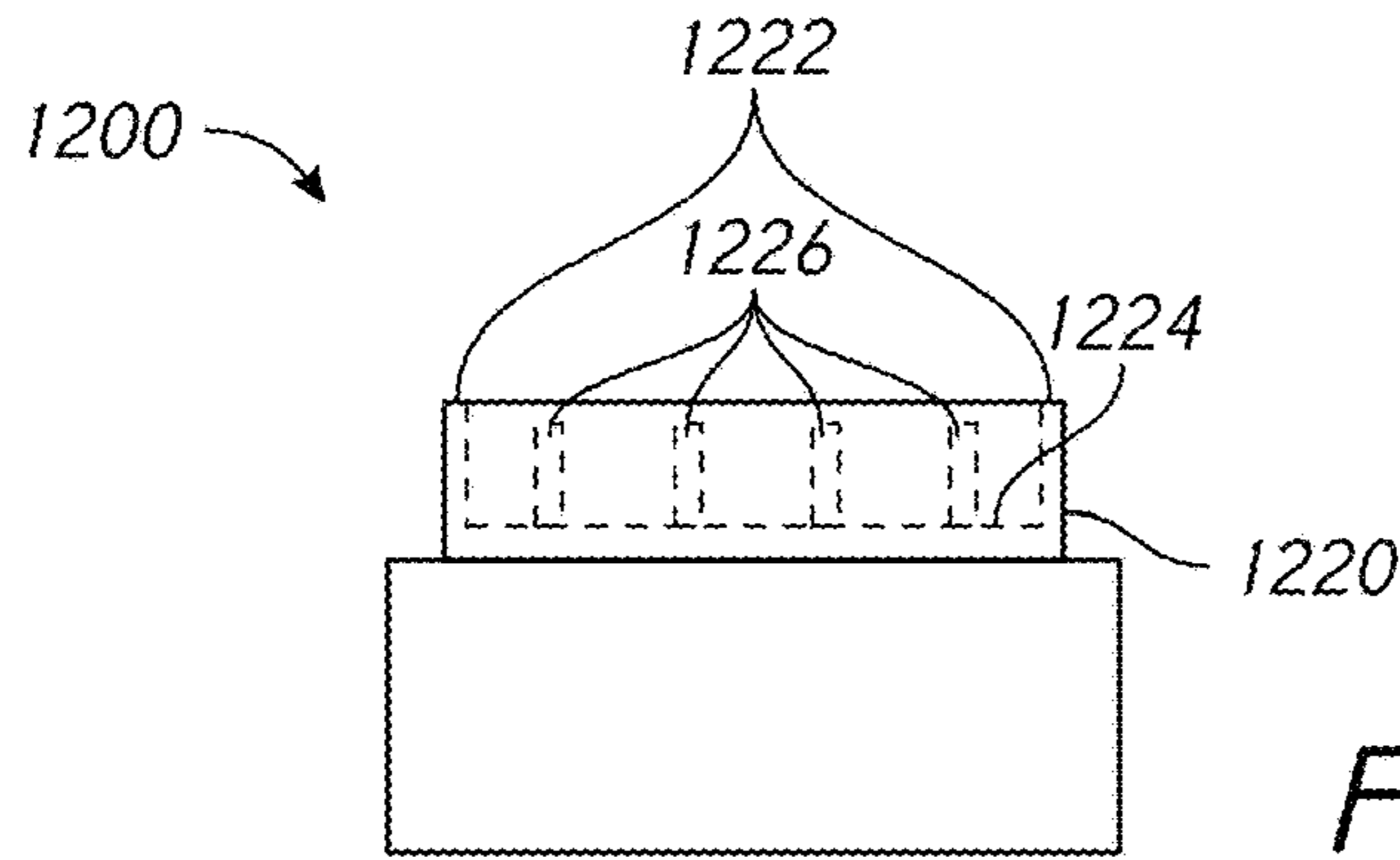


FIG. 13A

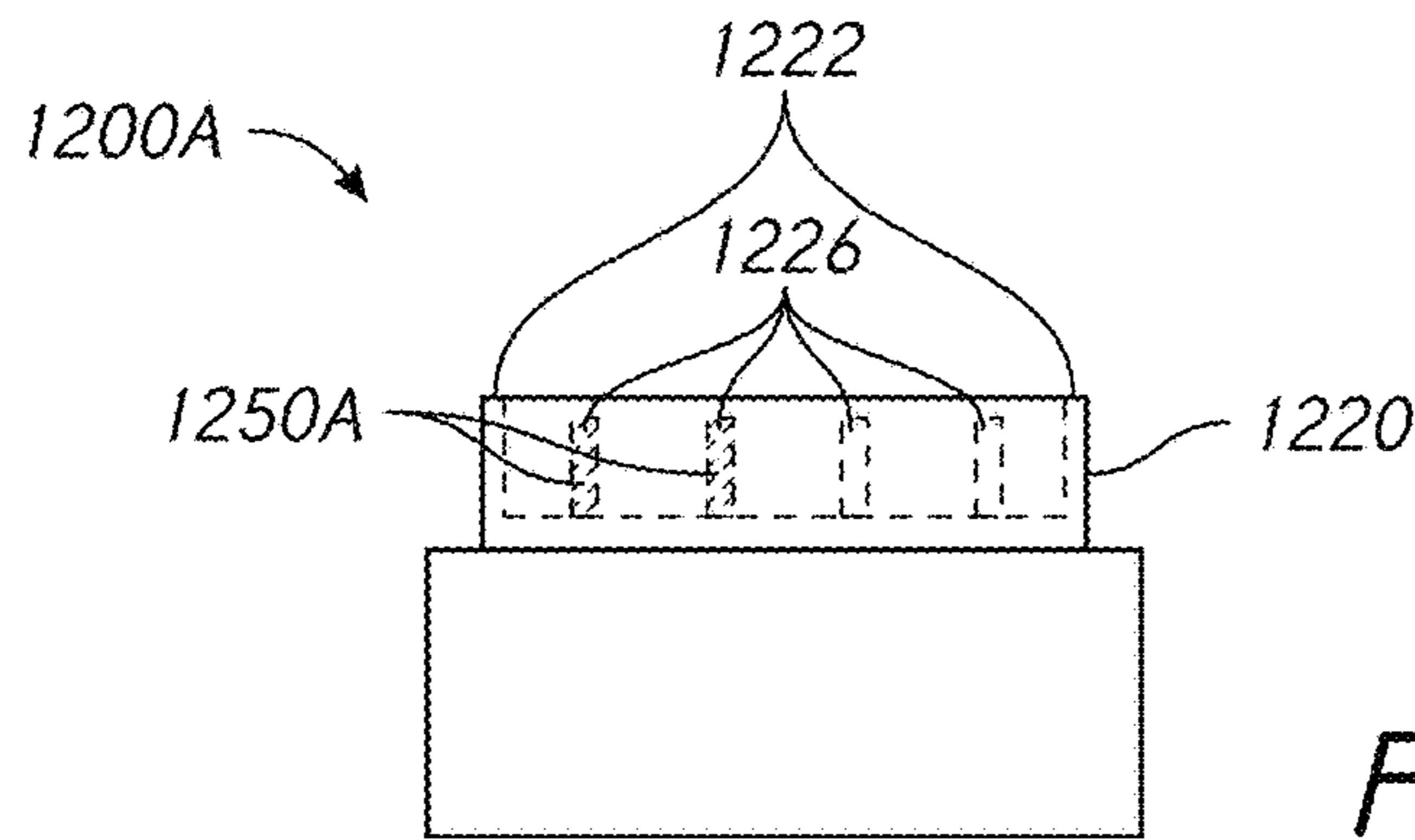


FIG. 13B

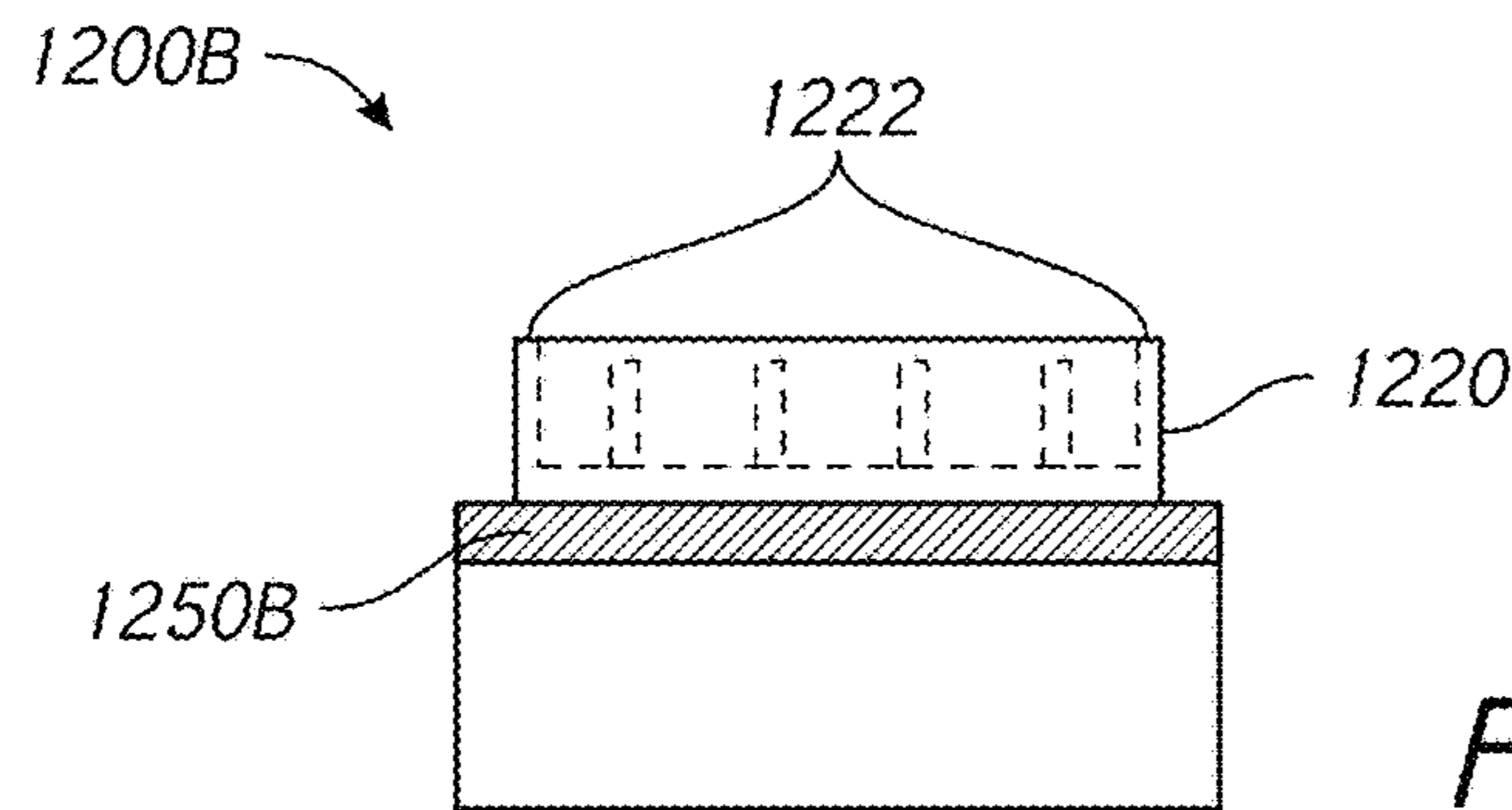


FIG. 13C

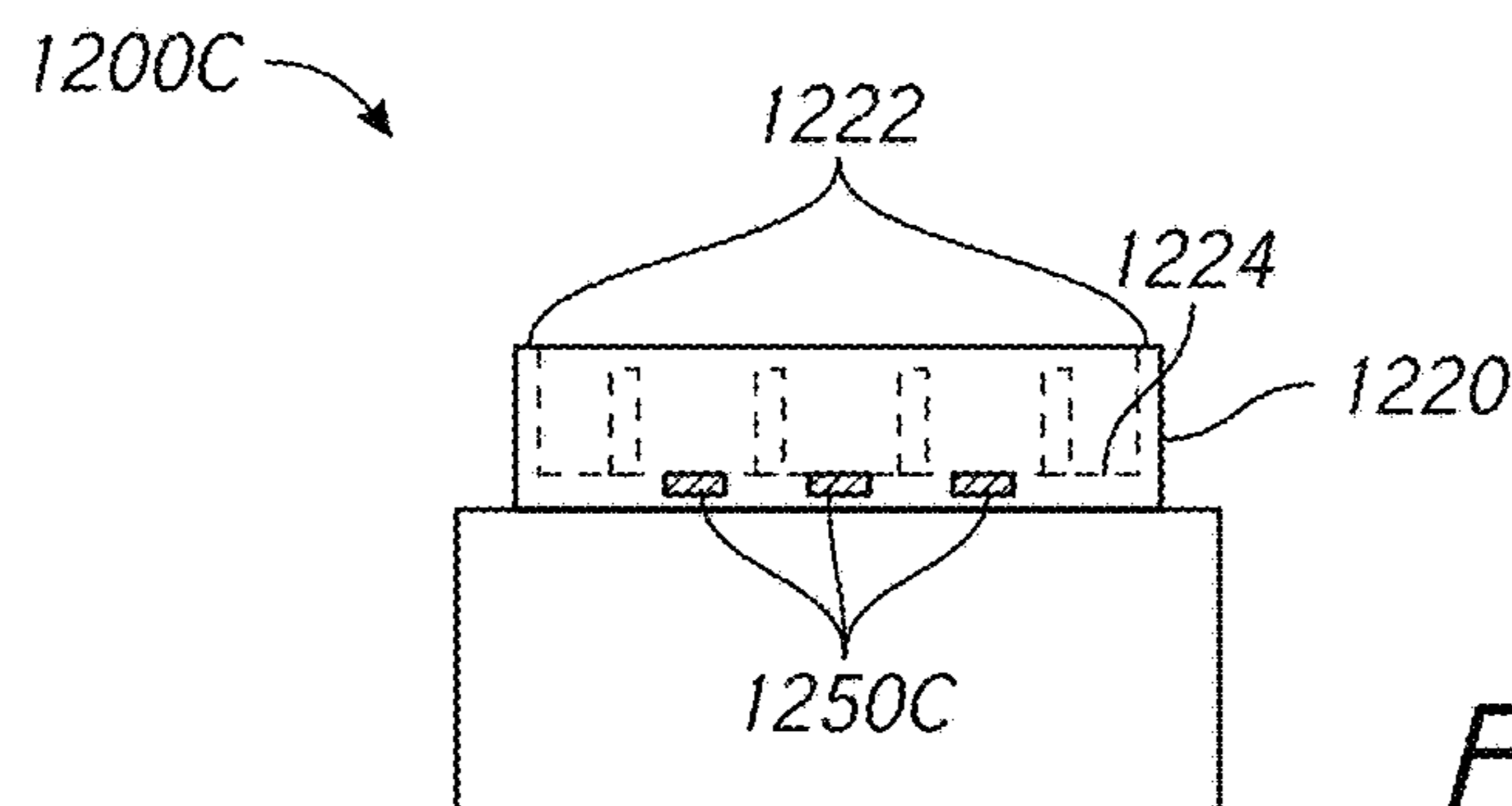


FIG. 13D

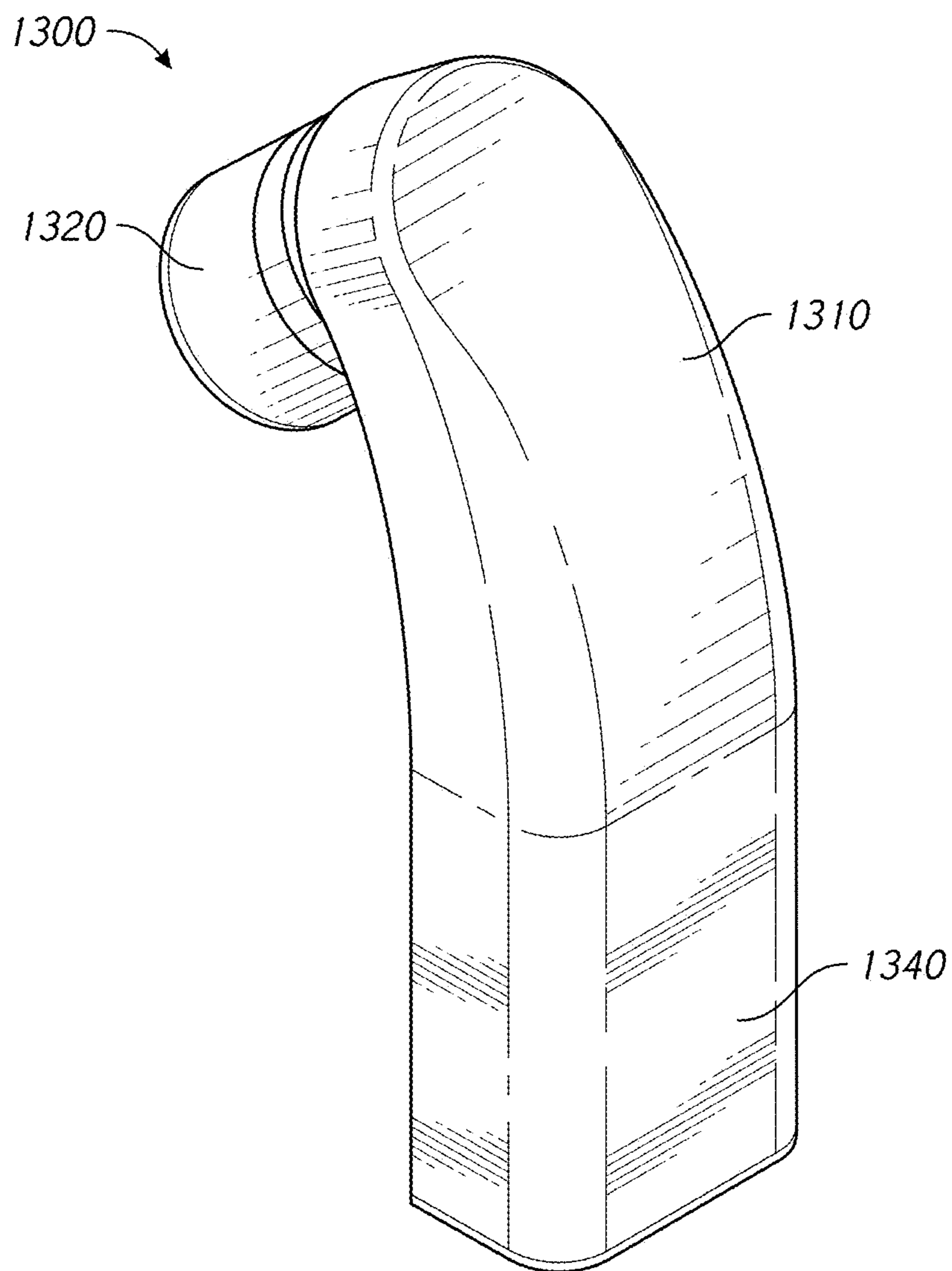


FIG. 14

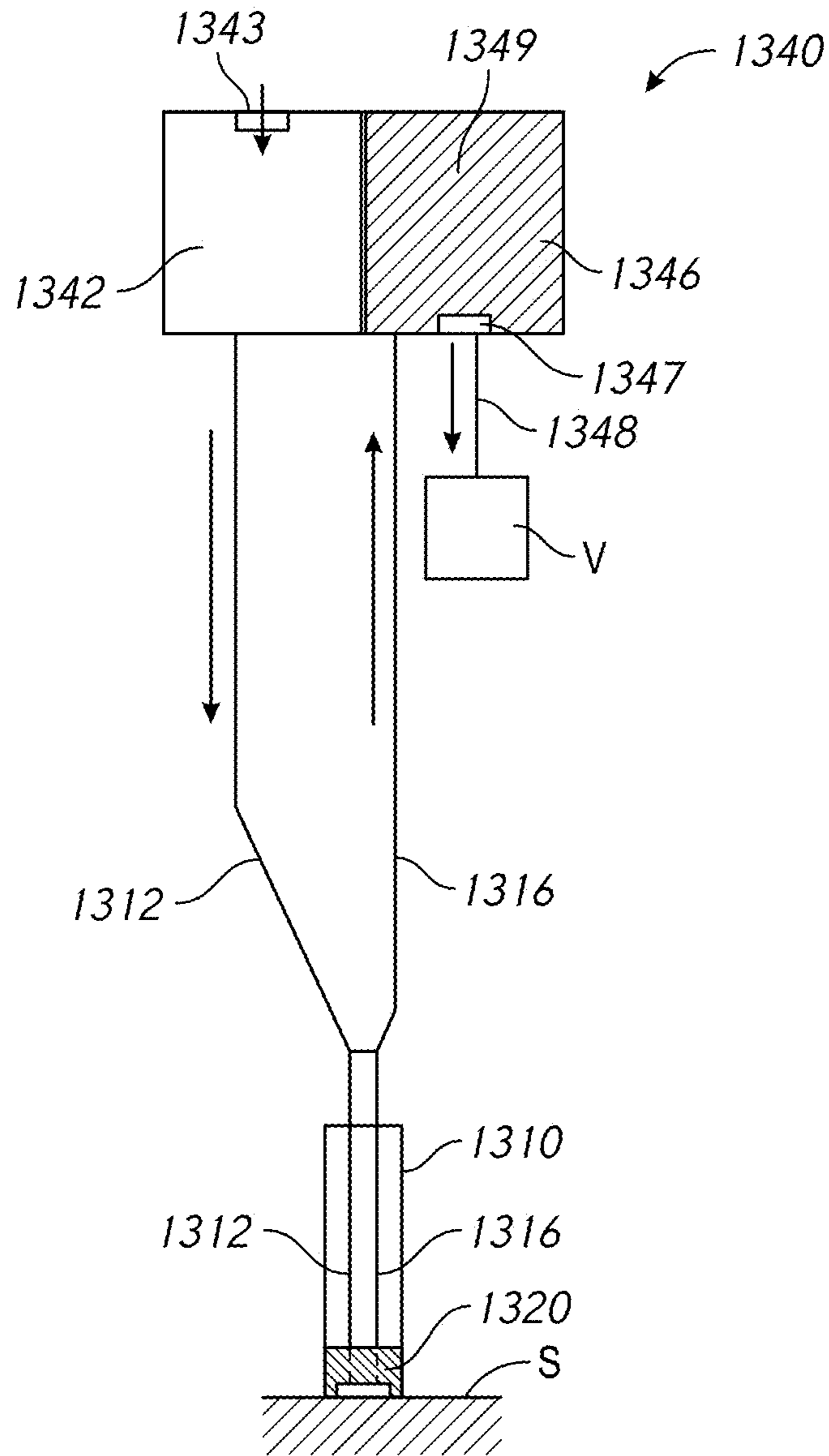


FIG. 15

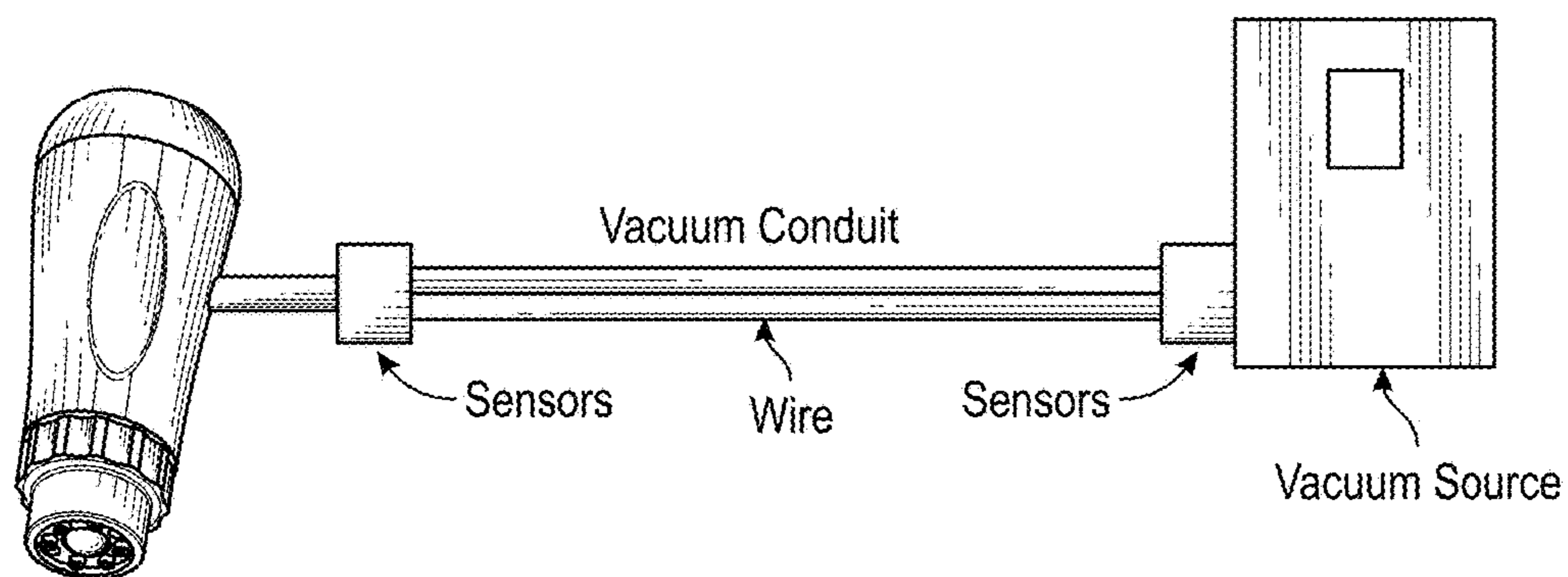


FIG. 16

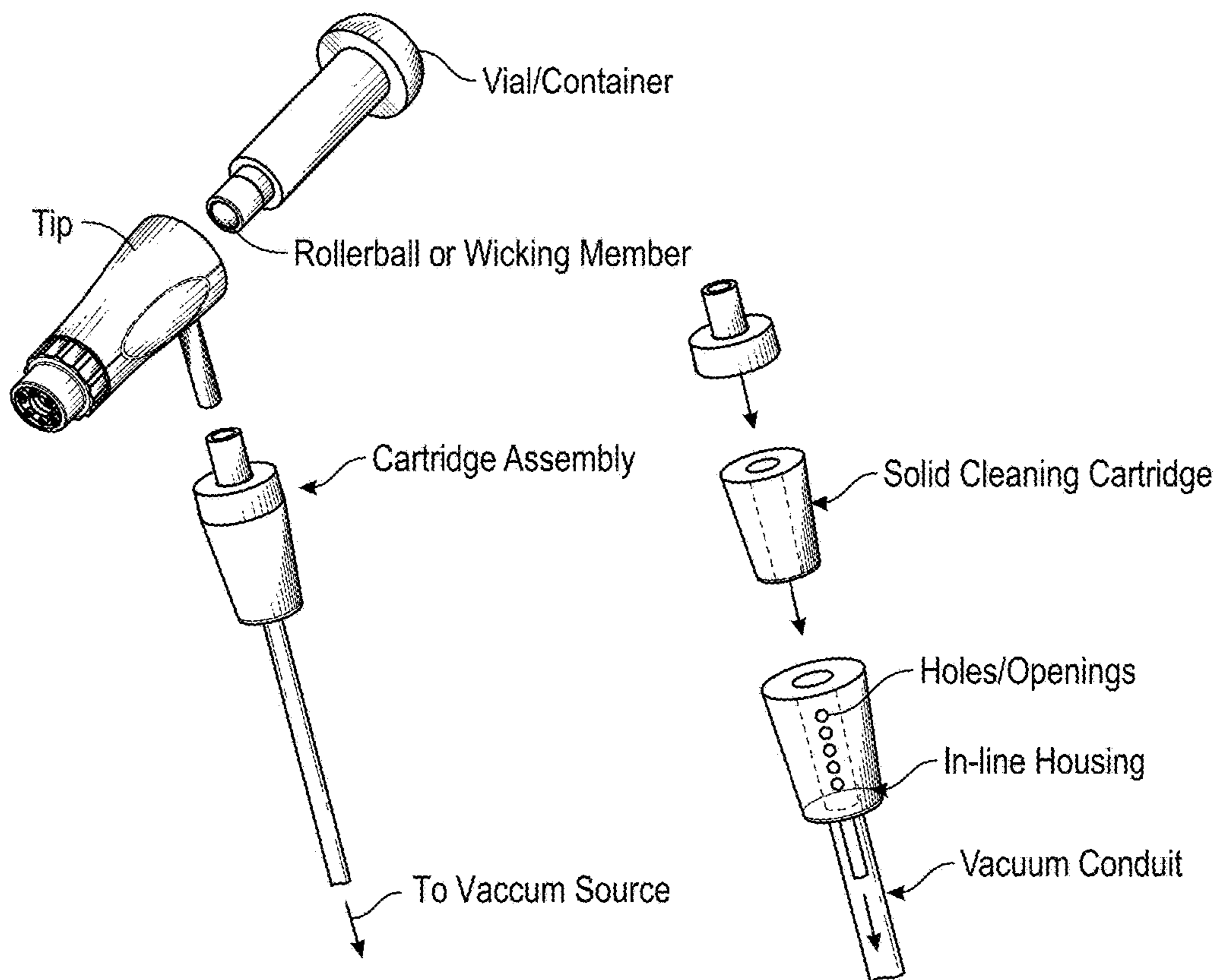


FIG. 17A

FIG. 17B

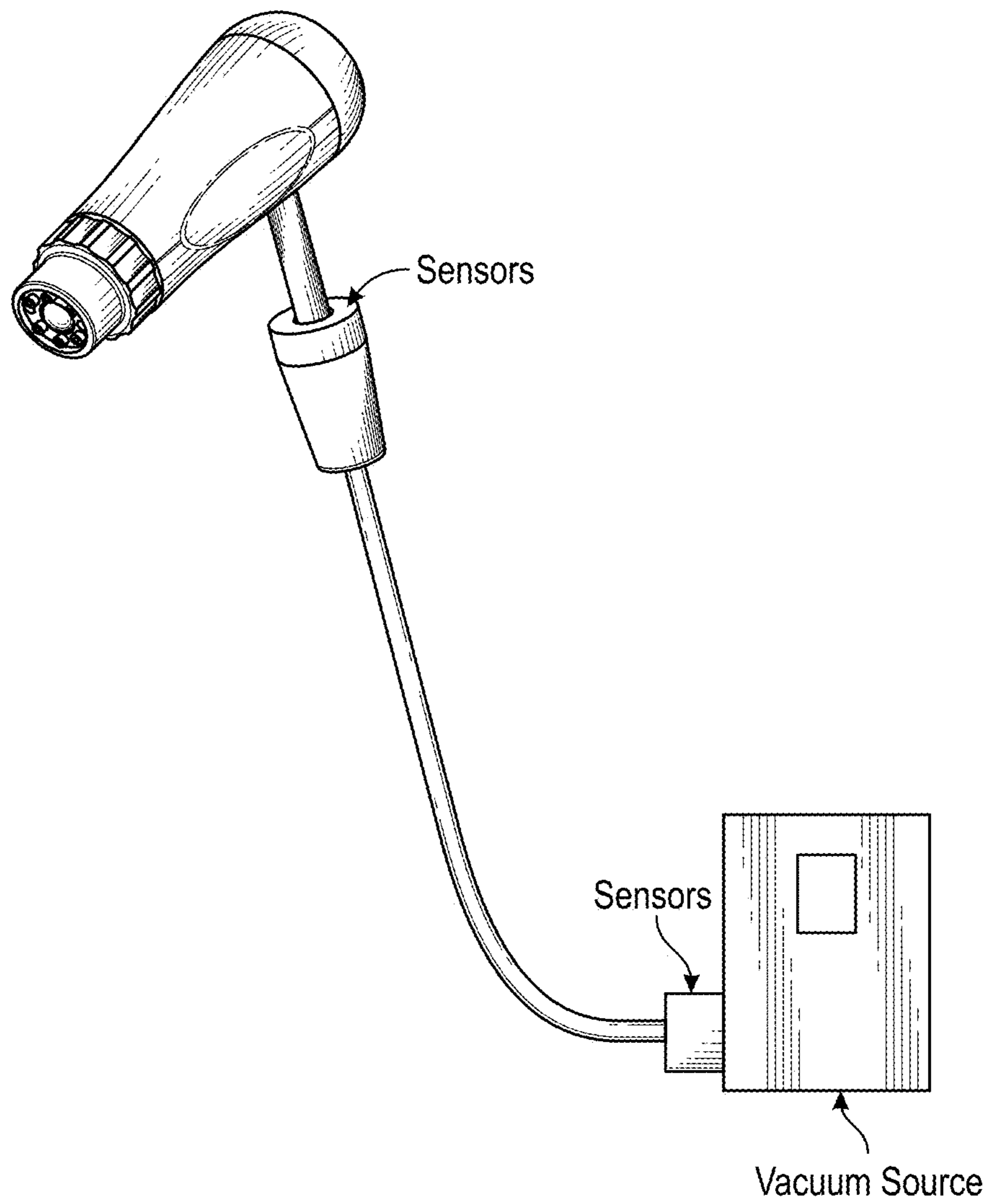


FIG. 18

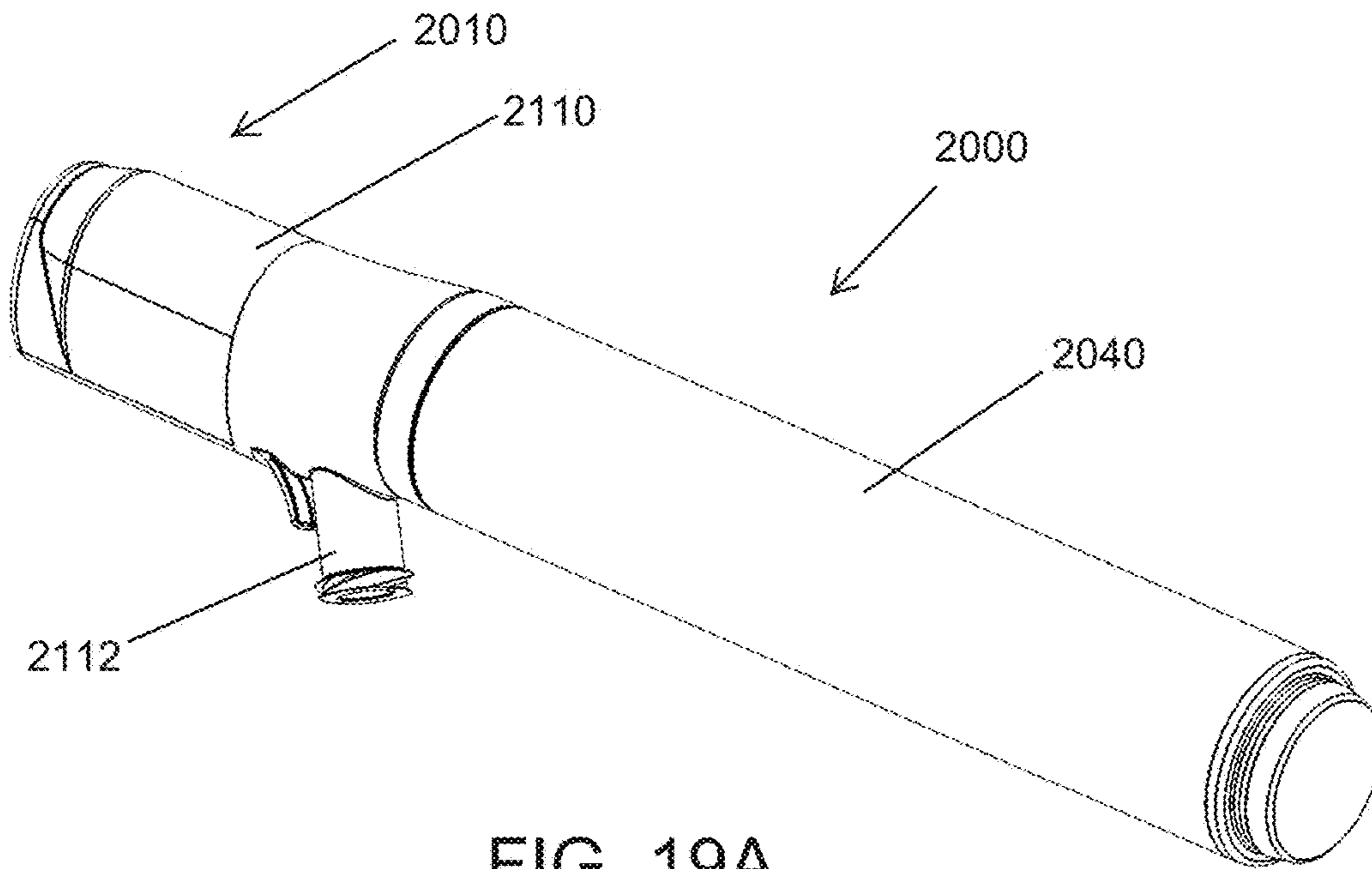


FIG. 19A

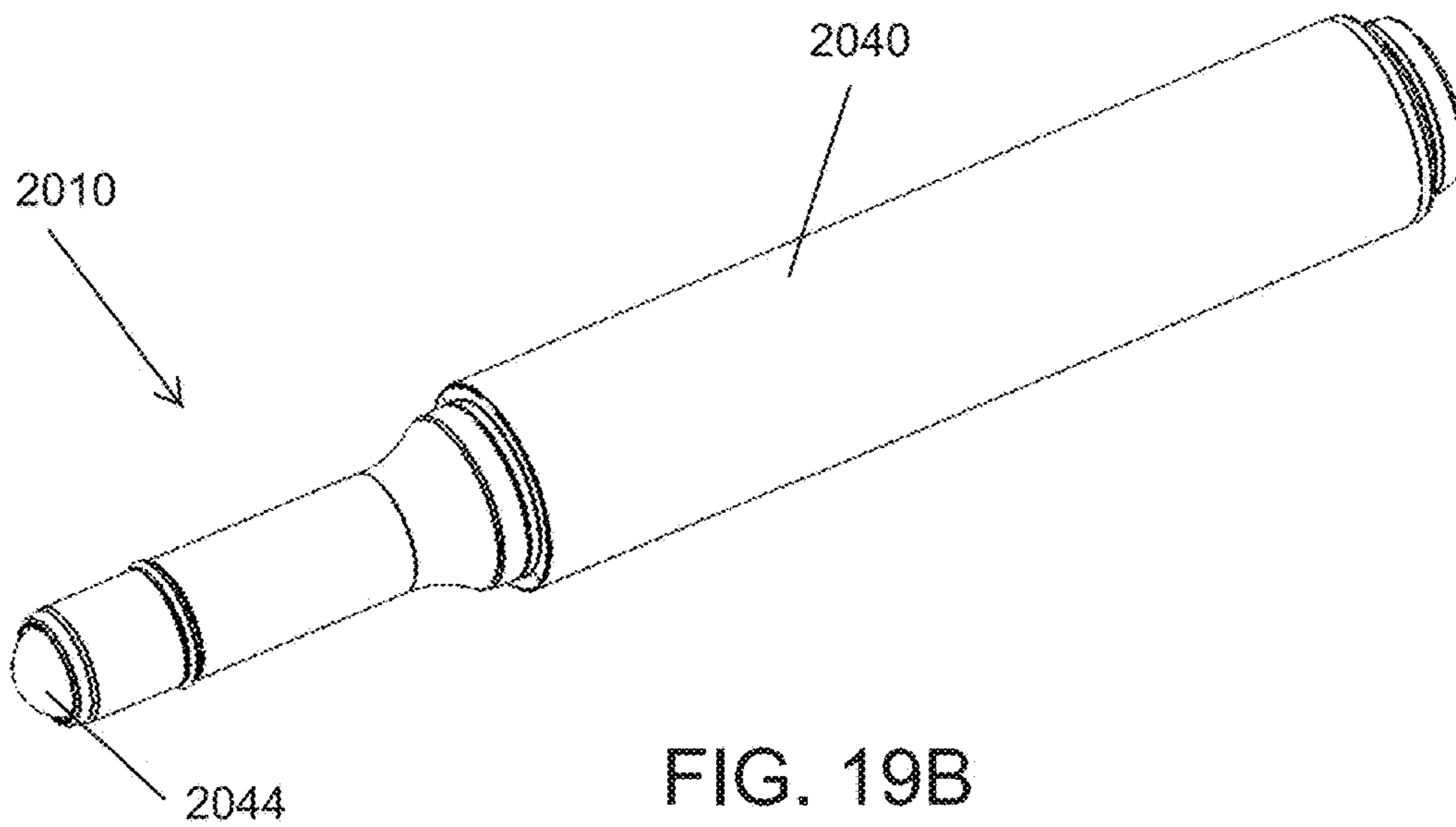


FIG. 19B

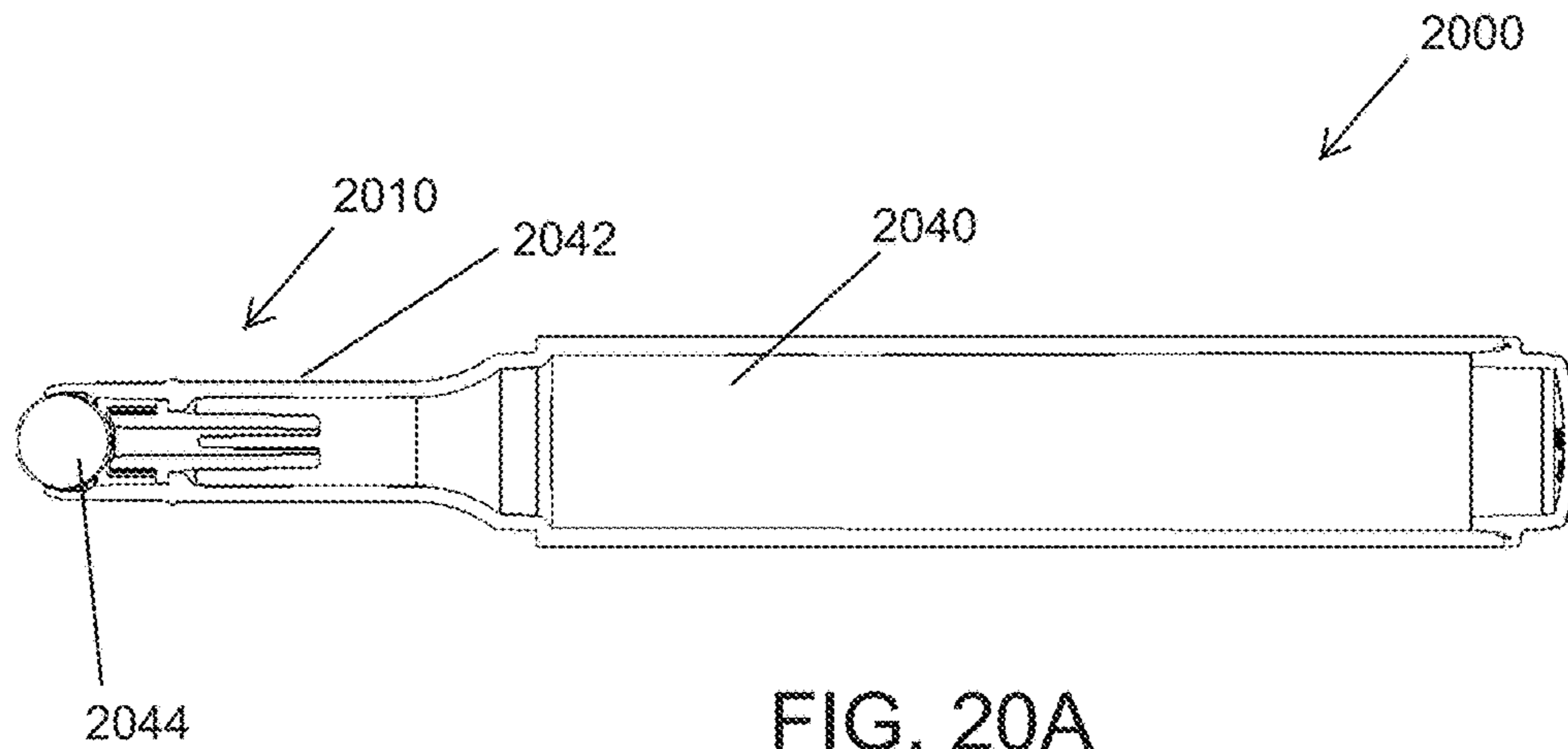


FIG. 20A

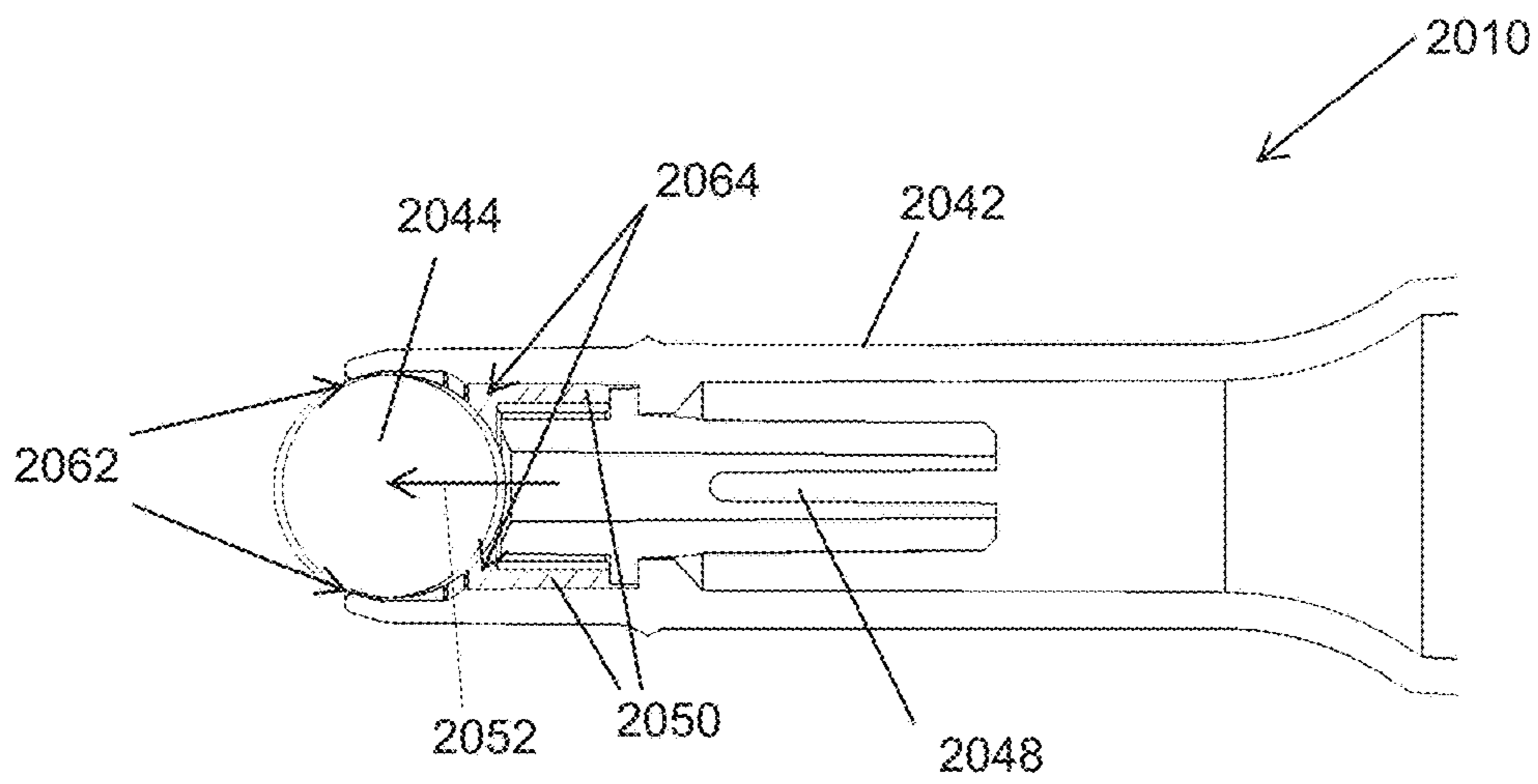


FIG. 20B

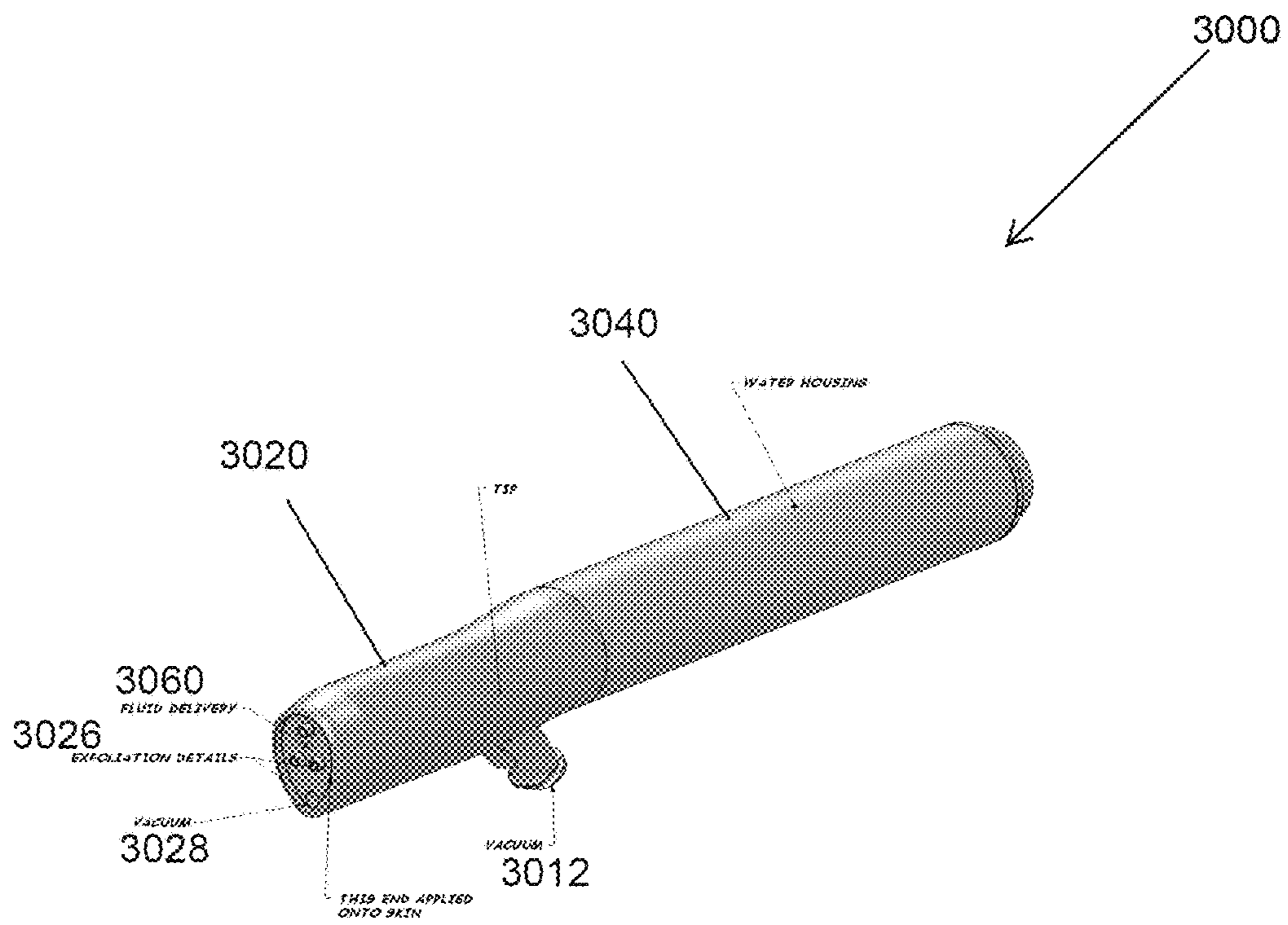


FIG. 21A

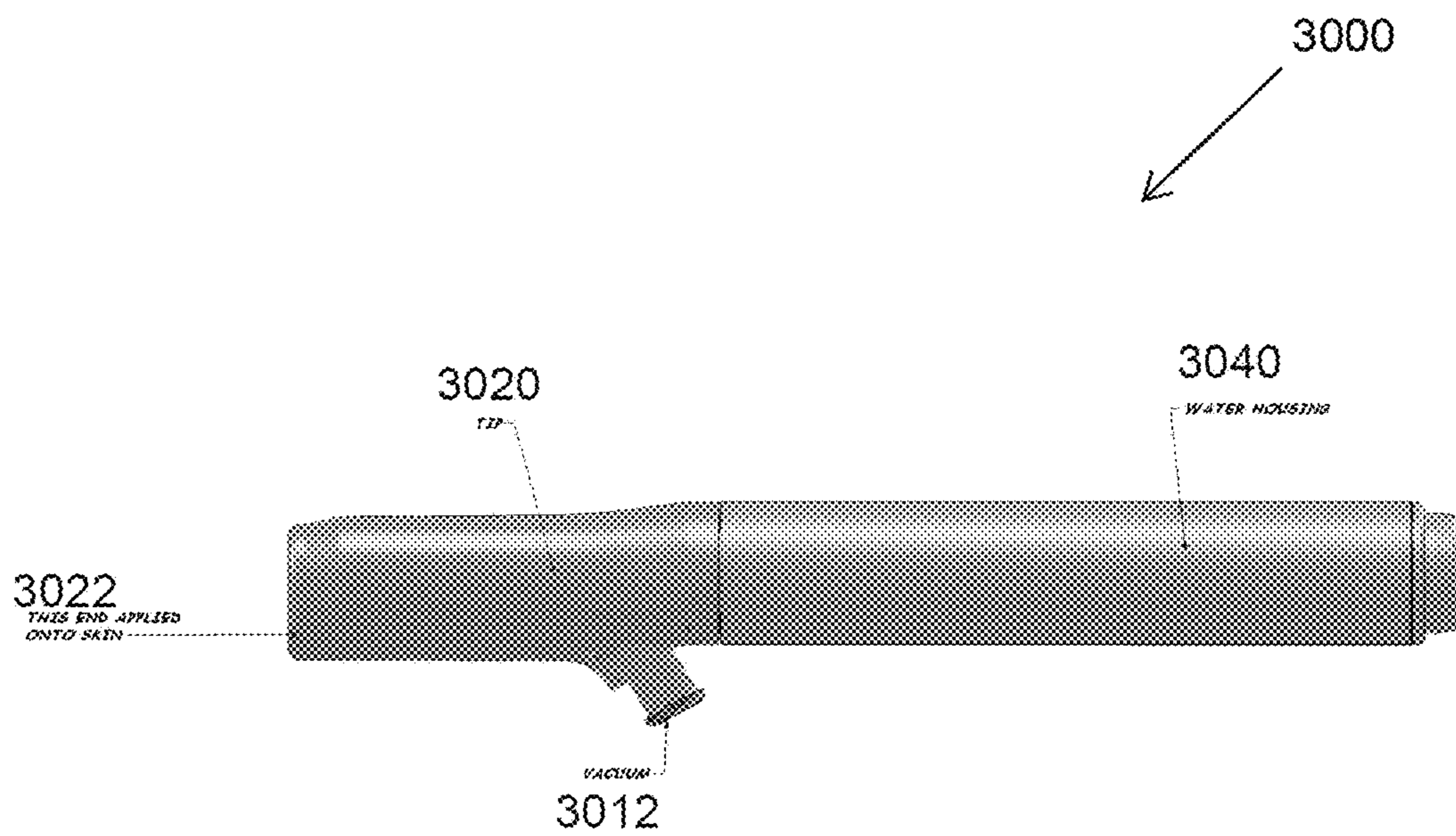


FIG. 21B

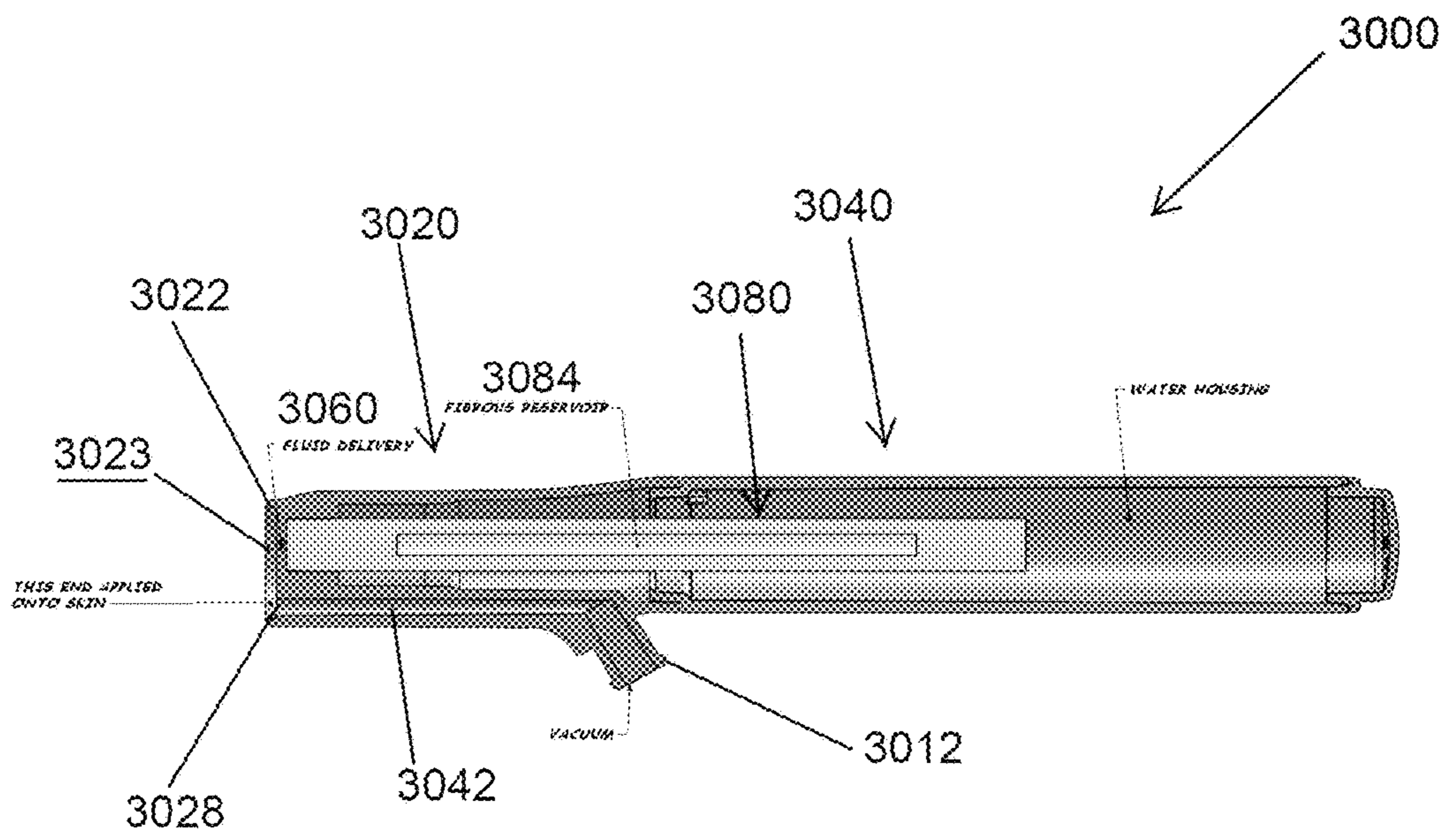


FIG. 21C

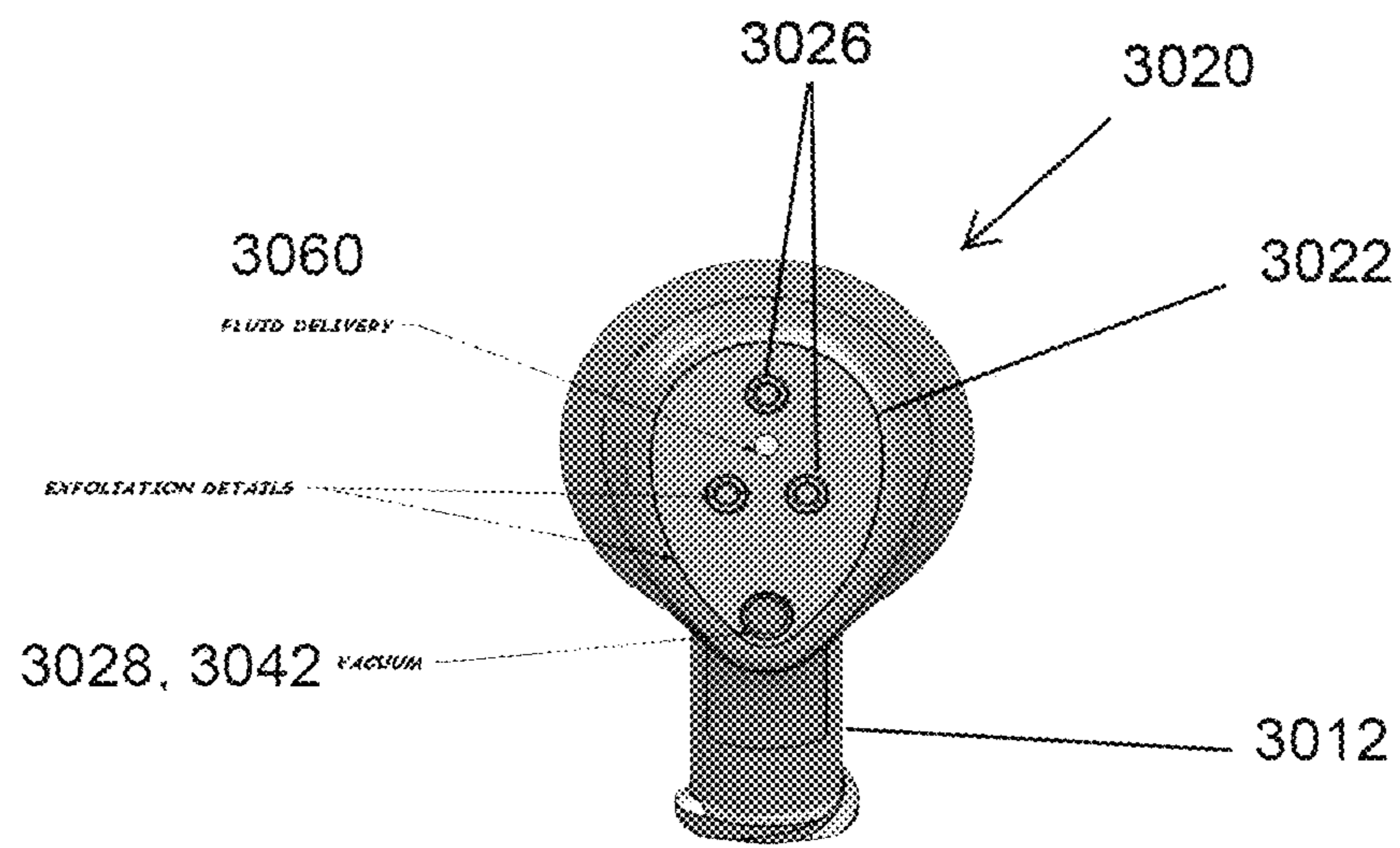


FIG. 21D

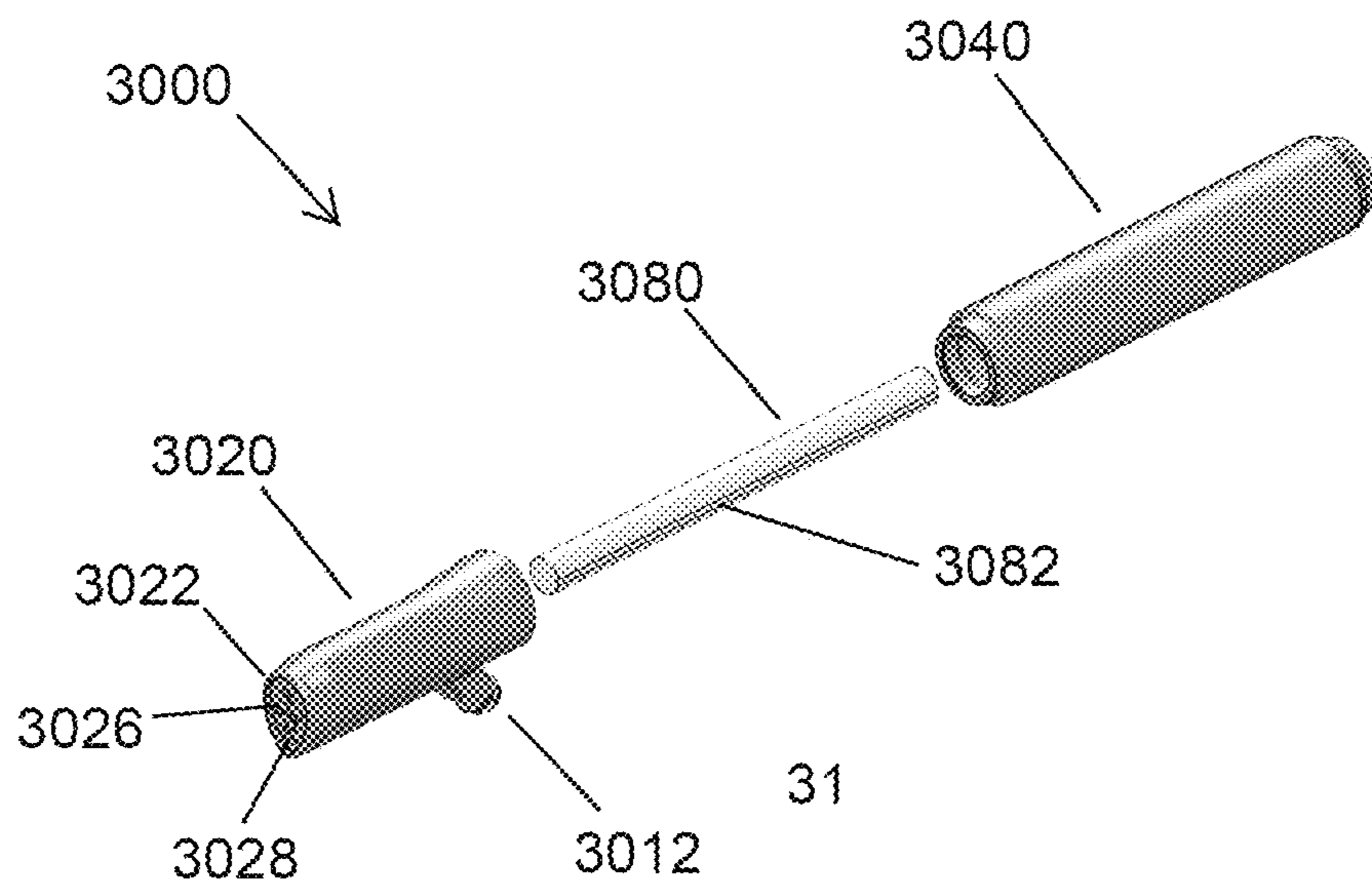


FIG. 21E

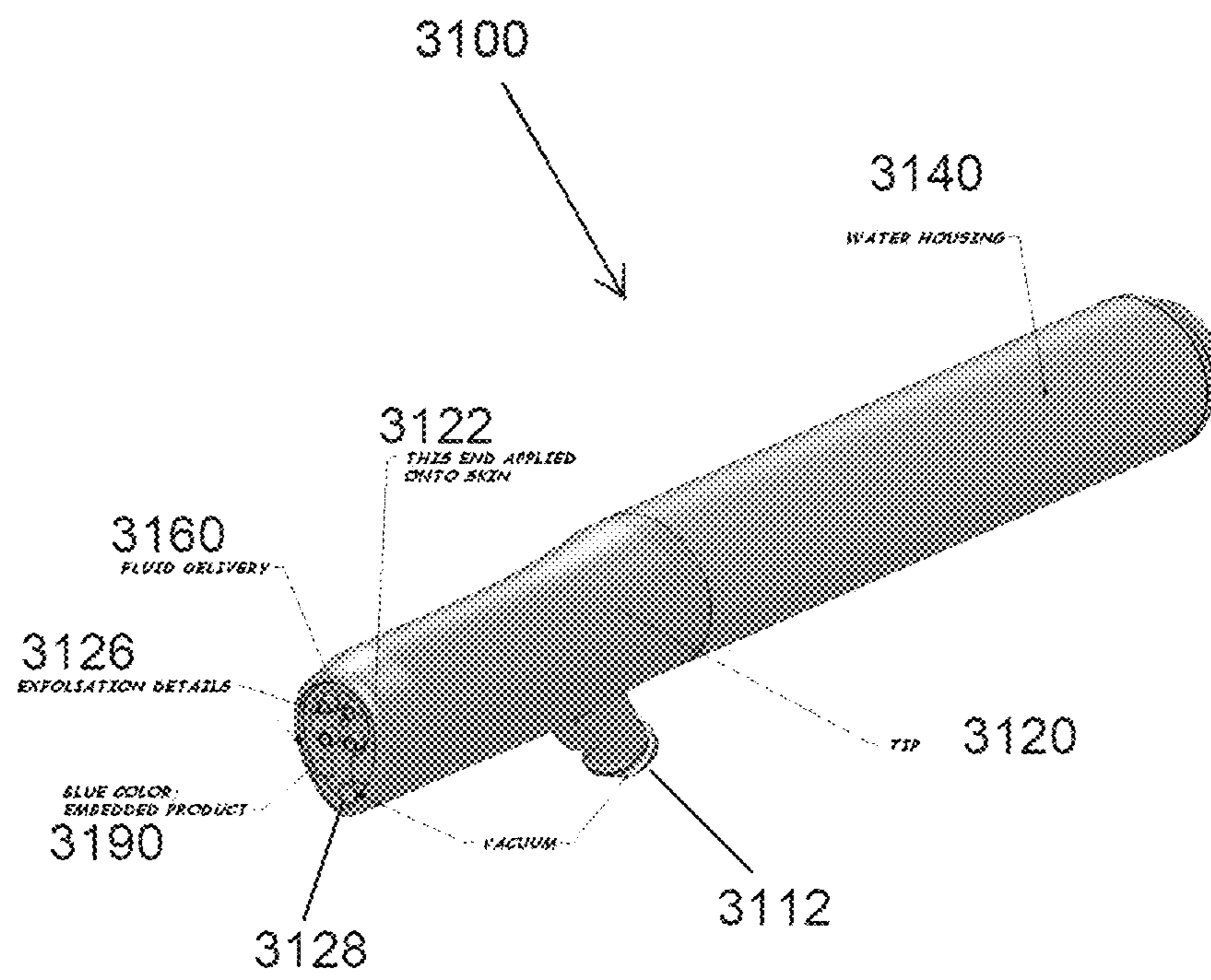


FIG. 22A

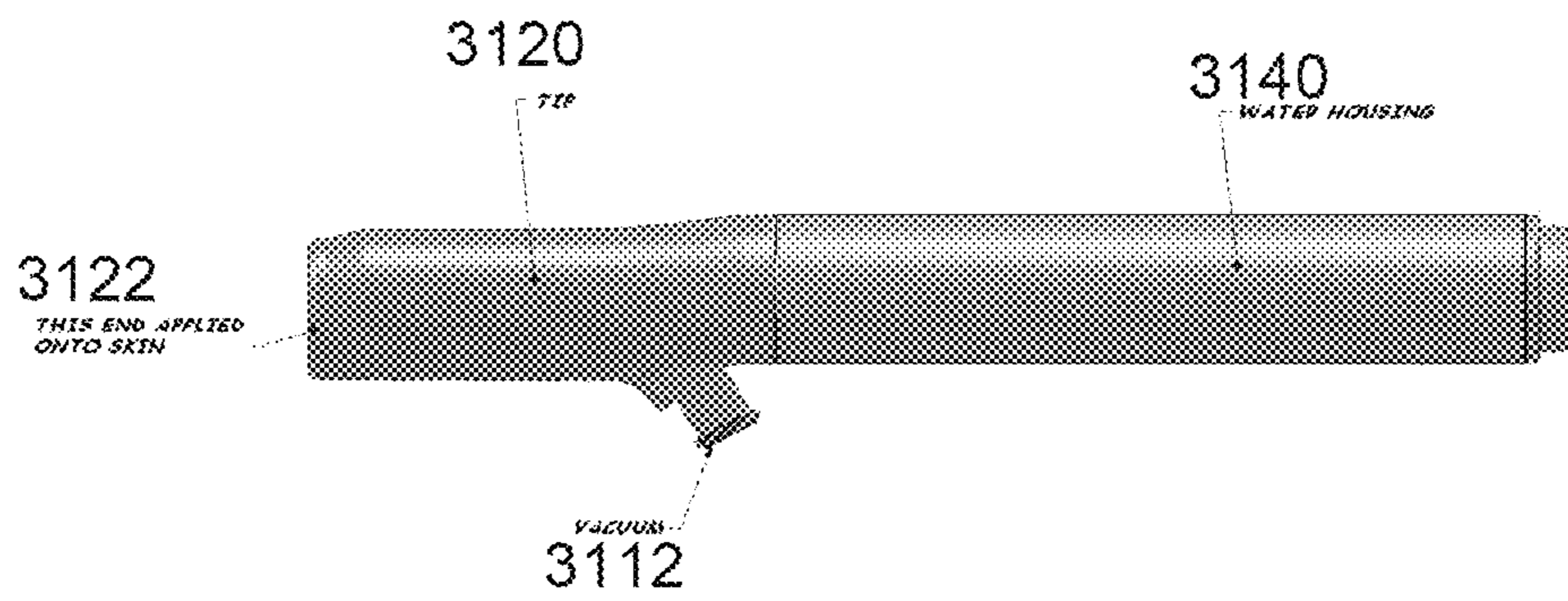


FIG. 22B

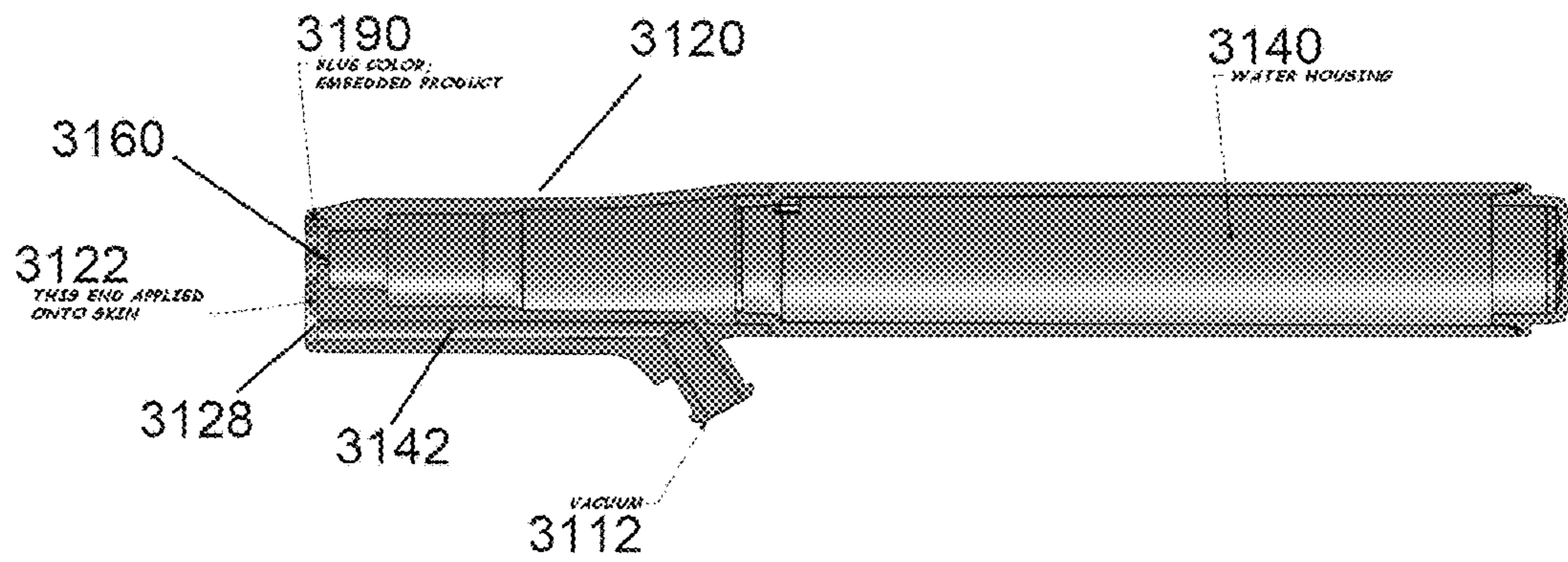


FIG. 22C

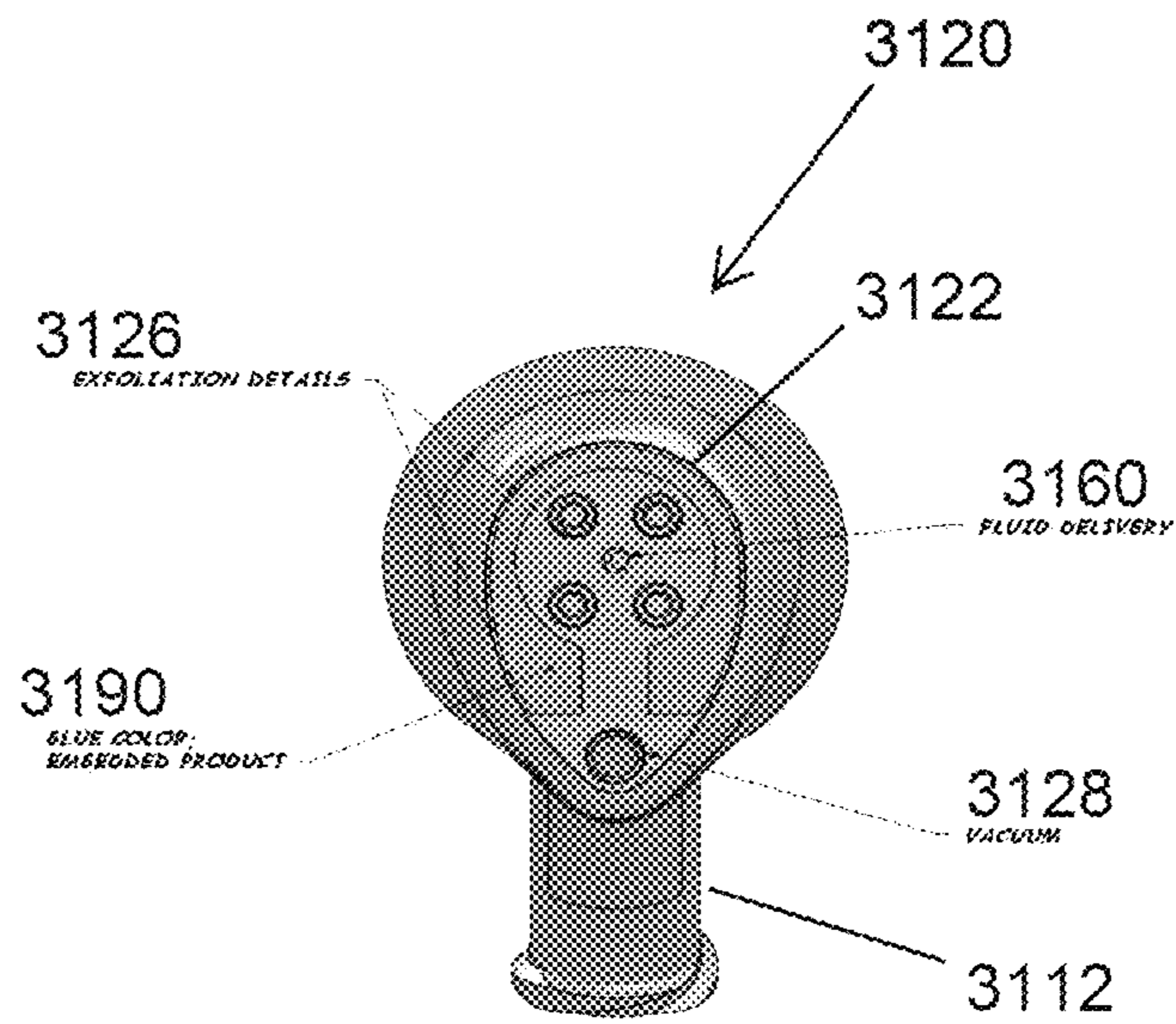


FIG. 22D

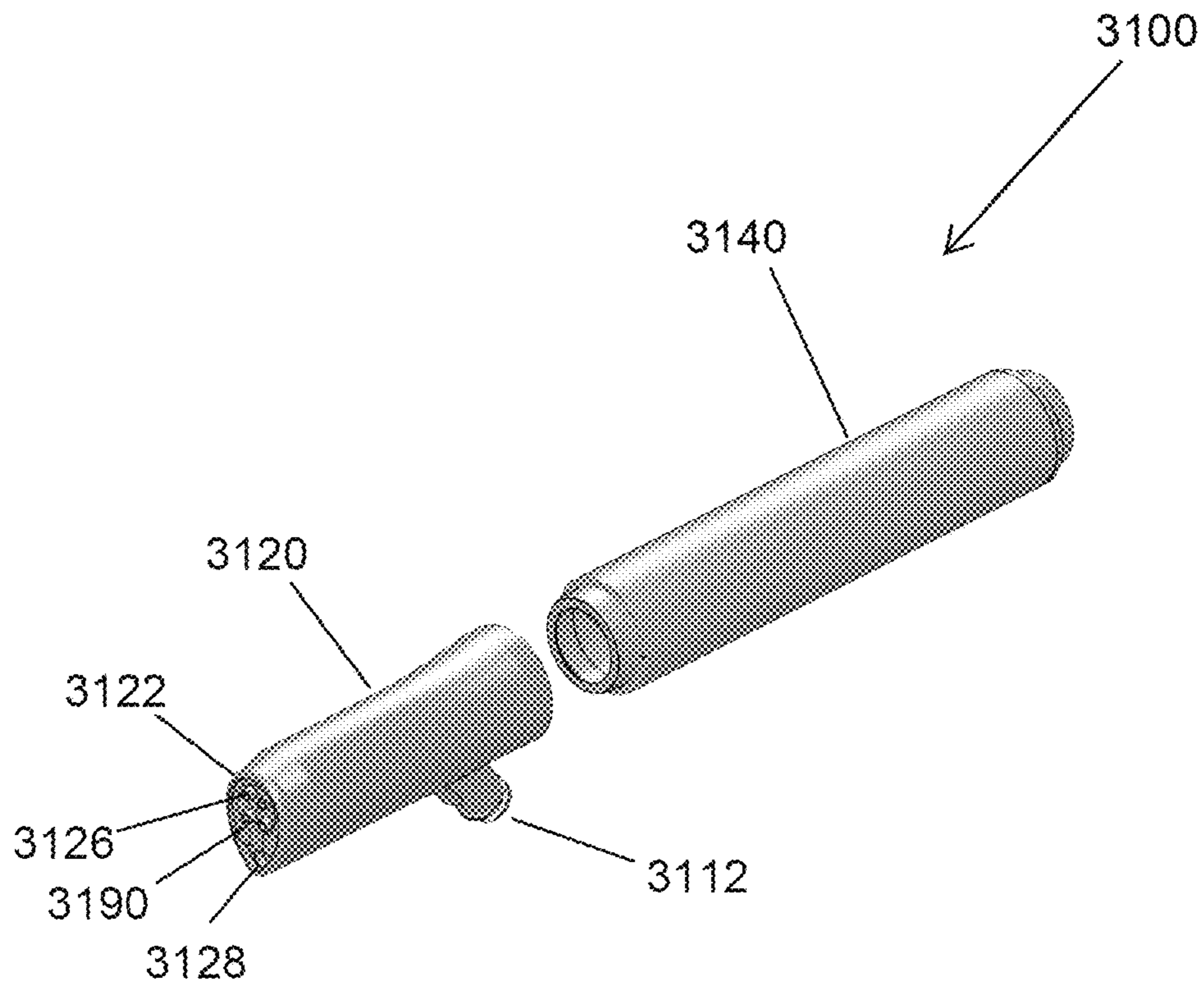


FIG. 22E

DEVICES AND METHODS FOR TREATING THE SKIN USING A POROUS MEMBER

PRIORITY AND CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part (CIP) of U.S. patent application Ser. No. 15/354,754, filed on Nov. 17, 2016, which is a continuation of U.S. patent application Ser. No. 14/998,375, filed on Dec. 23, 2015 and issued as U.S. Pat. No. 9,498,610 on Nov. 22, 2016, which claims the priority benefit of U.S. Provisional Application No. 62/096,493, filed on Dec. 23, 2014, and U.S. Provisional Application No. 62/235,479, filed Sep. 30, 2015. This application also claims the priority benefit of U.S. Provisional Application 62/328,596, filed Apr. 27, 2016. The entireties of all of the foregoing are bodily incorporated herein and made part of the present application.

BACKGROUND

Field

This application relates generally to skin treatment, and more specifically, to apparatuses, systems and methods for treating a person's skin using one or more porous members, rollerballs and/or the like.

Description of the Related Art

Abrasion of the outer layer or epidermis of the skin is desirable to smooth or blend scars, blemishes, or other skin conditions that may be caused by, for example, acne, sun exposure, and aging. Standard techniques used to abrade the skin have generally been separated into two fields referred to as dermabrasion and microdermabrasion. Both techniques remove portions of the epidermis called the stratum corneum, which the body interprets as a mild injury. The body then replaces the lost skin cells, resulting in a new outer layer of skin. Additionally, despite the mild edema and erythema associated with the procedures, the skin looks and feels smoother because of the new outer layer of skin. In some arrangements, skin can be treated by delivering one or more substances to the skin. In some instances, the application of suction along the skin surface can further enhance a skin treatment procedure.

SUMMARY

According to some embodiments, a skin treatment assembly comprises a tip comprising a proximal end and a distal end, a container configured to secure to the tip along the proximal end of the tip, wherein the container is configured to contain a liquid, and a porous member configured to extend at least partially within an interior of the container such that it contact a liquid contained within the container, wherein the porous member is configured to extend at least partially within an interior of the tip and is configured to facilitate the transfer of liquid from the container to the distal end of the tip.

According to some embodiments, the porous member comprises a wicking material. In some embodiments, the porous member is removable and replaceable relative to the tip and the container. In one embodiment, the porous member is rigid or semi-rigid.

According to some embodiments, the porous member comprises at least one internal reservoir or region. In some arrangements, the internal reservoir or region is configured to be at least partially hollow. In one embodiment, the internal reservoir or region is configured to contain at least

one flexible or other member. In some embodiments, the at least one flexible or other member comprises a felt or another absorbent material or member.

According to some embodiments, at least one treatment material is positioned within the internal reservoir or region, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid. In some embodiments, at least one treatment material is positioned within the porous member, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid.

According to some embodiments, at least one treatment material is positioned along or near the tip, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid.

According to some embodiments, the assembly further comprises at least one suction passageway that extends to or near the tip, wherein the at least one suction passageway is configured to be placed in fluid communication with a suction source to selectively create suction along the distal end of the tip.

According to some embodiments, the tip comprises at least one abrasive member or structure configured to at least partially abrade skin when the assembly is moved relative to skin tissue during a treatment procedure.

According to some embodiments, a skin treatment assembly comprises a handpiece comprising a distal end, the handpiece comprising a recess or cavity configured to receive a cartridge or other fluid container, a tip configured to be positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, at least one rollerball configured to extend to or near the tip, wherein the at least one rollerball is configured to be in fluid communication with an interior of a cartridge or other fluid container secured to the handpiece, wherein the at least one rollerball is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the rollerball is moved relative to said skin surface, at least one suction conduit extending to the tip, wherein the at least one suction conduit is configured to be placed in fluid communication with a vacuum source to selectively apply suction to the tip during use, and at least one abrasive structure or member located on, near or along the tip, the at least one abrasive structure or member being configured to selectively exfoliate the subject skin during use.

According to some embodiments, the rollerball is secured to a distal end of the cartridge or other fluid container. In some embodiments, the rollerball is secured to the handpiece. In some embodiments, the rollerball is secured to the tip. In one embodiment, the rollerball is in direct fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the rollerball is in indirect fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the rollerball is in fluid communication with the interior of the cartridge or other fluid container via one or more fluid conduits or passages.

According to some embodiments, the area proximal to the at least one rollerball comprises one or more vanes that increase an effective surface area of an area immediately adjacent the at least one rollerball along or near the cartridge or other fluid container to help maintain fluids from the cartridge or other fluid container immediately adjacent the at least one rollerball. In some embodiments, the assembly further comprises a porous member immediately adjacent the at least one rollerball to ensure that fluid from the

cartridge or other fluid container is placed in fluid communication with the at least one rollerball.

According to some embodiments, the tip comprises a peripheral lip, wherein the peripheral lip is sized, shaped and configured to contact a subject's skin tissue and generally form a seal along said skin tissue. In one embodiment, the at least one rollerball is positioned within an interior of the peripheral lip and extends to a height below the height of the peripheral lip. According to some embodiments, the cartridge or other fluid container is configured to be re-used during a subsequent treatment procedure.

According to some embodiments, a skin treatment assembly comprises a handpiece comprising a distal end, the handpiece being configured to receive a cartridge or being configured to be placed in fluid communication with a fluid source, a tip configured to be positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, a rollerball configured to extend to or near the tip, wherein the rollerball is configured to be in fluid communication with an interior of a cartridge or other fluid container secured to the handpiece, wherein the rollerball is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the rollerball is moved relative to said skin surface, and at least one abrasive structure or member located on, near or along the tip, the at least one abrasive structure or member being configured to selectively exfoliate the subject skin during use.

According to some embodiments, the assembly further comprises at least one suction conduit extending to or near the tip, wherein the at least one suction conduit is configured to be placed in fluid communication with a suction source to selectively apply suction to the tip during use. In some embodiments, the rollerball is secured to a distal end of the cartridge or other fluid container. In one embodiment, the rollerball is secured to the handpiece. In some arrangements, the rollerball is secured to the tip.

According to some embodiments, the rollerball is in direct or indirect fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the assembly further comprises a porous member adjacent (e.g., immediately adjacent) the at least one rollerball to ensure that fluid from the cartridge or other fluid container is placed in fluid communication with the at least one rollerball. In some embodiments, the tip comprises a peripheral lip, wherein the peripheral lip is sized, shaped and configured to contact a subject's skin tissue and generally form a seal along said skin tissue.

According to some embodiments, a skin treatment assembly comprises a handpiece comprising a distal end, the handpiece being configured to receive a fluid container, a tip positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, at least one porous member configured to extend to or near the tip, wherein the at least one porous member is configured to be in fluid communication with an interior of a fluid container secured to the handpiece, wherein the at least one porous member is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the at least one porous member is moved relative to said skin surface, at least one suction conduit extending to the tip, wherein the at least one suction conduit is configured to be placed in fluid communication with a vacuum source to selectively apply suction to the tip during use, and at least one abrasive structure or member located on, near or along the tip, the at least one

abrasive structure or member being configured to selectively exfoliate the subject skin during use.

According to some embodiments, the at least one porous member is secured to a distal end of the cartridge or other fluid container. In some embodiments, the at least one porous member comprises a wicking material. In some embodiments, the at least one porous member is secured to the handpiece. In some embodiments, the at least one porous member is secured to the tip. In one embodiment, the at least one porous member is in direct fluid communication with the interior of the cartridge or other fluid container.

According to some embodiments, the at least one porous member is in indirect fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the at least one porous member is in fluid communication with the interior of the fluid container via one or more fluid conduits or passages. In one embodiment, the tip comprises a peripheral lip, wherein the peripheral lip is sized, shaped and configured to contact a subject's skin tissue and generally form a seal along said skin tissue. In some embodiments, the cartridge or other fluid container is configured to be re-used during a subsequent treatment procedure.

According to some embodiments, a skin treatment assembly comprises a handpiece comprising a distal end, the handpiece being configured to receive a fluid container, a tip positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, a porous member configured to extend to or near the tip, wherein the porous member is configured to be in fluid communication with an interior of a fluid container secured to the handpiece, wherein the porous member is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the porous member is moved relative to said skin surface, and at least one suction conduit extending to the tip, wherein the at least one suction conduit is configured to be placed in fluid communication with a vacuum source to selectively apply suction to the tip during use.

According to some embodiments, the at least one porous member is secured to a distal end of the cartridge or other fluid container. In some embodiments, the at least one porous member comprises a wicking material. In one embodiment, the at least one porous member is secured to the handpiece. In some embodiments, the at least one porous member is secured to the tip. In some embodiments, the at least one porous member is in direct fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the at least one porous member is in indirect fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the at least one porous member is in fluid communication with the interior of the fluid container via one or more fluid conduits or passages.

According to some embodiments, the assembly further comprises at least one abrasive structure or member located on, near or along the tip, the at least one abrasive structure or member being configured to selectively exfoliate the subject skin during use. In some embodiments, the at least one abrasive structure or member comprises a ridge or portion comprising a sharp surface.

According to some embodiments, a method of treating a skin surface of a subject comprises conducting a first skin treatment procedure on a subject at a professional facility, wherein the first skin treatment procedure comprises skin treatment using a handpiece, the handpiece comprising a tip and a removable cartridge, the tip being configured to

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contact a skin surface of a subject during use, wherein a rollerball is configured to extend to or near the tip, wherein the rollerball is configured to be in fluid communication with an interior of a cartridge or other fluid container secured to the handpiece, wherein the a rollerball is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the rollerball is moved relative to said skin surface, at least partially exfoliating a skin surface of a subject at the professional facility by moving the tip relative to the subject's skin surface, providing the cartridge or other fluid container to the subject following the first skin treatment procedure, and instructing the subject to conduct a second skin treatment procedure following the first skin treatment procedure, wherein the second skin treatment procedure is performed by the subject, the second skin treatment procedure comprising providing delivering a volume of fluids from the cartridge or other fluid container to a skin surface of the subject.

According to some embodiments, the method further comprises a third skin treatment procedure following the second skin treatment procedure, wherein the third skin treatment procedure is performed at a professional facility. In some embodiments, the subject brings the cartridge or other fluid container to the professional facility. In some arrangements, the second skin treatment procedure does not comprise exfoliation. In one embodiment, the second skin treatment procedure comprises only fluid delivery to the skin surface of the subject.

According to some embodiments, the first skin treatment procedure comprises skin exfoliation, wherein the tip comprises at least one abrasive surface configured to at least partially exfoliate skin when the handpiece is moved relative to the subject's skin. In some arrangements, the at least one abrasive surface comprises at least one sharp surface along the tip. In one embodiment, the at least one sharp surface comprises a spiral member extending distally from a base surface of the tip. In some arrangements, the at least one sharp surface comprises a post member extending distally from a base surface of the tip. In some embodiments, the cartridge or other fluid container comprises a cap to protect the rollerball following the first and second skin treatment procedures.

According to some embodiments, a method of treating a skin surface of a subject includes conducting a first skin treatment procedure on a subject at a treatment facility, wherein the first skin treatment procedure comprises skin treatment using a handpiece, the handpiece comprising a tip and a cartridge configured to be positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, wherein at least one of a rollerball and a porous member is configured to extend to or near the tip, wherein the at least one of a rollerball and a porous member is configured to be in fluid communication with an interior of a cartridge or other fluid container secured to the handpiece, wherein the at least one of a rollerball and a porous member is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the rollerball or porous member is moved relative to said skin surface, at least partially exfoliating a skin surface of a subject at the treatment facility by moving the tip relative to the subject's skin surface;

providing the cartridge or other fluid container to the subject following the first skin treatment procedure, and instructing the subject to conduct a second skin treatment procedure following the first skin treatment procedure, wherein the second skin treatment procedure

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is performed by the subject, the second skin treatment procedure comprising providing delivering a volume of fluids from the cartridge or other fluid container to a skin surface of the subject.

According to some embodiments, the method further comprises a third skin treatment procedure following the second skin treatment procedure, wherein the third skin treatment procedure is performed at a treatment facility. In some embodiments, the subject brings the cartridge or other fluid container to the treatment facility. In some embodiments, the second skin treatment procedure does not comprise exfoliation. In one embodiment, the second skin treatment procedure comprises only fluid delivery to the skin surface of the subject.

According to some embodiments, the first skin treatment procedure comprises skin exfoliation, wherein the tip comprises at least one abrasive surface configured to at least partially exfoliate skin when the handpiece is moved relative to the subject's skin. In some embodiments, the at least one abrasive surface comprises at least one sharp surface along the tip. In some embodiments, the at least one sharp surface comprises a spiral member extending distally from a base surface of the tip. In one embodiment, the at least one sharp surface comprises a post member extending distally from a base surface of the tip. In some arrangements, the cartridge or other fluid container comprises a cap to protect the at least one of a rollerball and a porous member following the first and second skin treatment procedures.

According to some embodiments, a skin treatment assembly comprises a handpiece comprising a distal end, the handpiece comprising a recess or cavity configured to receive a cartridge or other fluid container, a tip configured to be positioned along the distal end of the handpiece, the tip being configured to contact a skin surface of a subject during use, and at least one rollerball configured to extend to or near the tip, wherein the rollerball is configured to be in fluid communication with an interior of a cartridge or other fluid container secured to the handpiece, wherein the at least one rollerball is configured to contact the skin surface of the subject during use and to facilitate the delivery of fluids to said skin surface as the rollerball is moved relative to said skin surface.

According to some embodiments, the rollerball is secured to a distal end of the cartridge or other fluid container. In one embodiment, the rollerball is secured to the handpiece. In some embodiments, the rollerball is secured to the tip.

According to some embodiments, the rollerball is in direct fluid communication with the interior of the cartridge or other fluid container. In some embodiments, the rollerball is in indirect fluid communication with the interior of the cartridge or other fluid container. In one embodiment, the rollerball is in fluid communication with the interior of the cartridge or other fluid container via one or more fluid conduits or passages.

According to some embodiments, the assembly further comprising at least one suction conduit extending to the tip, wherein the at least one suction conduit is configured to be placed in fluid communication with a vacuum source to selectively apply suction to the tip during use. In one embodiment, the tip comprises a peripheral lip, wherein the peripheral lip is sized, shaped and configured to contact a subject's skin tissue and generally form a seal along said skin tissue.

According to some embodiments, the assembly further comprises at least one abrasive structure or member located on, near or along the tip, the at least one abrasive structure or member being configured to selectively exfoliate the

subject skin during use. In some embodiments, the cartridge or other fluid container is configured to be re-used during a subsequent treatment procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects and advantages of the present application are described with reference to drawings of certain embodiments, which are intended to illustrate, but not to limit, the present inventions. It is to be understood that these drawings are for the purpose of illustrating the various concepts disclosed herein and may not be to scale.

FIG. 1 illustrates an exploded perspective view an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 2 illustrates an exploded perspective view an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 3 illustrates an exploded perspective view an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 4 illustrates an exploded perspective view an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 5 illustrates an exploded perspective view an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 6A illustrates a cross-sectional view of an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 6B illustrates perspective and corresponding exploded perspective views of an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 7 illustrates a perspective view of an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 8 illustrates a front view of a tip configured to be positioned along a distal end of an assembly disclosed herein, according to one embodiment;

FIGS. 9A and 9B illustrate different views of an assembly comprising a rollerball for use with a skin treatment system according to one embodiment;

FIG. 10 illustrates a perspective view of an assembly comprising a wicking member for use with a skin treatment system according to one embodiment;

FIG. 11 schematically illustrates a side view of an assembly comprising a wicking member for use with a skin treatment system according to one embodiment;

FIG. 12 schematically illustrates a side view of an assembly comprising a wicking member and a rollerball for use with a skin treatment system according to one embodiment;

FIG. 13A schematically illustrates a side view of an embodiment of a tip configured to be positioned along a distal end of a skin treatment assembly;

FIGS. 13B to 13D illustrates different embodiments of the tip of FIG. 13A having a wicking or other porous material positioned on and/or along one or more tip portions;

FIG. 14 illustrates a perspective view of one embodiment of a skin treatment assembly comprising fluid supply and waste containers attached along the proximal end of the assembly;

FIG. 15 schematically illustrates a skin treatment system similar to the system depicted in FIG. 14;

FIG. 16 illustrates one embodiment of a system comprising a vacuum source that is in fluid communication with a handpiece or other skin treatment device;

FIGS. 17A and 17B illustrate different exploded views of a system comprising cartridge assembly located between the skin treatment device and a vacuum source according to some embodiments;

FIG. 18 illustrates one embodiment of a skin treatment system comprising sensors along or near opposite ends of a vacuum conduit that places a skin treatment member in fluid communication with a vacuum source;

FIGS. 19A and 19B illustrate different perspective views of an assembly comprising a rollerball for use with a skin treatment system according to another embodiment;

FIGS. 20A and 20B illustrate different cross-sectional views of the assembly of FIGS. 19A and 19B;

FIGS. 21A-21E illustrate various views of one embodiment of a handpiece assembly comprising a porous member; and

FIGS. 22A-22E illustrate various views of another embodiment of a handpiece assembly comprising a porous member.

DETAILED DESCRIPTION

Although the various embodiments of a handpiece assembly have specific relevance to a skin treatment system, the features, advantages and other characteristics disclosed herein may have direct or indirect applicability in other applications, such as, for example, medical devices, mechanical devices and/or the like. For instance, the various configurations disclosed herein have specific relevance to exfoliation and/or other removal of the superficial layer of skin cells. However, the various systems, devices and methods disclosed herein can be modified and/or otherwise configured for use with skin treatment procedures that target removal of deeper tissue layers, as desired or required.

FIG. 1 illustrates one embodiment of an assembly 100 configured for use with a skin treatment system. As shown, the assembly 100 can include one or more components or portions that are configured to secure to one another. In some embodiments, for example, the assembly 100 comprises a handpiece 110 that is adapted to receive a tip 120 along its distal end. The tip 120 can be revocable from the handpiece 110, as depicted in FIG. 1. However, in other embodiments, the tip 120 can be permanently attached to the handpiece 110 and/or can otherwise be integrated with the handpiece 110, as desired or required. In some embodiments, the tip 120 can be removable and disposable. The use of such removable tips 120 can facilitate the use of the assembly (e.g., between different subjects) and/or can permit a user to customize a skin treatment procedure. For example, in some embodiments, the tip 120 comprises one or more abrasive features, components and/or portions to help abrade or exfoliate skin as the handpiece is moved relative to skin. For example, in some arrangements, the tip 120 comprises one or more of the following: one or more spiral members, cylinders, posts, gritty surfaces, other abrasive members or features, ridges, sharp edges, diamonds and/or the like. Additional details regarding the tips are included in U.S. patent application Ser. No. 11/392,348, filed on Mar. 29, 2006 and issued as U.S. Pat. No. 8,048,089 on Nov. 1, 2011, the entirety of which is incorporated by reference herein.

In other embodiments, however, the tip need not include any abrasive and/or other components or features that are configured to abrade skin. Thus, in some configurations, the tip 120 can simply provide a mechanism or means by which fluids and/or other components are selectively delivered to the skin surface.

With continued reference to FIG. 1, the handpiece 110 is configured to removably receive a cartridge 140 or other container. For example, the cartridge 140 can be inserted within a corresponding recess of the handpiece 110 (e.g., along the proximal end of the handpiece 110). In other arrangements, however, the cartridge 140 or other container can be positioned along any other portion of the handpiece 110. In other embodiments, the cartridge 140 can be placed in fluid communication or otherwise fluidly coupled to the handpiece 110 and/or the tip 120.

For any of the assembly embodiments disclosed herein, depending on the specific treatment protocol being administered to a subject, a cartridge can comprise one or more of the following: skin tightening agents, platelet-rich plasma (PRP), exfoliation agents, peptides, bleaching agents, anti-acne agents, human growth factors, cytokines, soluble collagen, antioxidants, matrix proteins, Epicatechin, Catechin and/or other phenols and/or other anti-oxidants, neurotoxins, serums, salicylic acid, other anti-acne acids and materials, microcapsules, capsules, other time-release products and substances, water (e.g., distilled, tap water, filtered, etc.), saline, other dilution agents, dilutants or solvents, vitamins, chemical exfoliation agents, lotions, soothing agents, brightening or lightening agents, peptides, peeling agents, acids, anesthetics, medicants, other non-active or active compounds, other fluids or materials, combination or mixtures thereof and/or any other substance from one or more internal/external fluid sources.

Any of the assembly embodiments disclosed herein comprise at least one rollerball, a wicking, porous and/or other absorptive member and/or other member to facilitate the delivery of one or more fluids and/or other substances from a fluid source (e.g., cartridge, other container, etc.) to the skin surface being treated (e.g., via a distal tip of the assembly). A portion or area of the rollerball or other member can be fluid communication (e.g., directly or indirectly) with the cartridge or other fluid source. In some embodiments, as the assembly is moved relative to a subject's skin surface, the rollerball and/or other member (e.g., wicking member, other porous or absorptive member, etc.) contacts the skin surface and rolls along the skin surface. In so doing, the rollerball can advantageously deliver fluid from the fluid source (e.g., cartridge, a manifold, etc.) to the tip and working surface along the assembly-skin interface. Accordingly, the rollerball and/or other delivery member can facilitate the delivery of fluids to the skin surface during a treatment procedure as the assembly is moved relative to such a surface.

In any of the embodiments disclosed herein, the rollerball can be secured within a housing or other retention assembly (e.g., of the cartridge, handpiece, tip, etc.), allowing it to rotate. The rollerball and/or other member (e.g., absorptive, wicking and/or other member) can be removably (e.g., replaceably) or permanently maintained within a retention assembly or other portion of the assembly, as desired or required. For example, the rollerball can be removed and replaced (e.g., to change its materials or other properties, to change its smoothness, texture or porosity, to change its size, to replace a damaged or used rollerball, etc.). However, in other configurations, the rollerball or other member is configured to not be removed from the corresponding housing or retention assembly.

In FIG. 1, the handpiece 110 of the assembly 100 comprises a central opening 112 along its distal end 111. The opening 112 can be sized, shaped and otherwise configured to at least partially receive the rollerball 144 located along the distal end 142 of the cartridge 140. Thus, in some

embodiments, the cartridge is configured to releasably engage the handpiece. The cartridge 140 and handpiece can be releasably secured to one another using one or more attachment features, devices and/or methods, such as, for example, a threaded connection, a friction fit or pressure fit connection, a flanged connection, a rotatable connection (e.g., comprising a recess and a corresponding tab), other mechanical or non-mechanical connections and/or the like. Regardless of the exact attachment or securement mechanism between the handpiece and the cartridge, once the cartridge has been adequately positioned relative to the handpiece, the rollerball 144 can be configured to extend at least partially along the distal end of the handpiece 110. In some arrangements, the cartridge or other container 140 comprises a dummy cartridge that is configured to be placed in fluid communication with a fluid delivery system (e.g., a manifold-based system). Thus, in such configurations, fluid from one or more fluid sources can be selectively delivered to the cartridge 140 and to the distal end (e.g., tip 120) using one or more fluid conduits, as desired or required.

With continued reference to FIG. 1, the distal tip 120 can be configured to be removably secured to the handpiece 110 (e.g., along the distal end 111 of the handpiece 110 and the proximal end 123 of the tip 120). As with any other connections between adjacent components or portions of the assembly 100, one or more O-rings 113 or other sealing members can be positioned along the interface of the tip 120 and the handpiece 110 (e.g., to prevent or reduce the likelihood of leaks), in accordance with a desired or required arrangement.

As depicted in FIG. 1, the tip 120 can include a central opening 122 along its distal end that coincides with (e.g., shares the same longitudinal axis as) the rollerball 144 and the opening 112 of the handpiece 110. Thus, when the assembly 100 is properly assembled or otherwise put together, the rollerball 144 can be adjacent the area defined by the central opening 122 of the tip 120. In some embodiments, the tip comprises a peripheral lip 124 that circumscribes a central area (e.g., an area at least partially defined by the central opening 122 of the tip 120). Further, the rollerball 144 can be sized, shaped and otherwise configured to be positioned within the central area circumscribed by the lip 124 of the tip 120. In some arrangements, the distal end of the rollerball 144 is recessed relative to the distal end of the tip's lip 124. However, in other configurations, the distal end of the rollerball 144 can be aligned with or generally aligned with the distal end of the lip 124 of the tip 120, as desired or required.

According to some embodiments, as discussed in greater detail herein, the assembly 100 is configured to be selectively coupled to a vacuum or suction source. Thus, the tip, handpiece, cartridge or other fluid source and/or any other portion of the assembly 100 can include one or more fluid passages, openings, ports, valves and/or any other features to enable the vacuum or suction capabilities of the assembly 100. For example, the tip can include one or more suction ports that are aligned with one or more fluid conduits (e.g., internal and/or external passages) of the handpiece 110. As discussed in greater detail herein, any of the disclosed embodiments can include one or more features (e.g., peripheral lip, interior feature such as posts or cylindrical members, spiral members, abrasive pad or members, and/or the like) that are configured to selectively abrade tissue. For example, in any of the embodiments, the peripheral lip 124 can be configured to at least partially abrade and/or otherwise remove skin tissue when the handpiece assembly is moved relative to the skin surface.

Regardless of the exact fluid components that an assembly **100** comprises to enable it to selectively deliver a vacuum or suction force to the tip **120**, the selective activation of such suction or vacuum can facilitate a skin treatment procedure and/or the use of the assembly. For example, in some embodiments, the use of suction can help with the delivery of fluids from a fluid source to the tip. In some embodiments, the use of vacuum can help create a seal between a periphery (e.g., lip) of the tip and the skin tissue, which in turn, can help with the delivery of fluids to the skin interface. As noted above, the use of a lip and/or any other interior members can assist with the at least partial abrading of tissue when the handpiece assembly is moved relative to a skin surface (e.g., especially when vacuum is being applied to the tip).

As illustrated in FIG. 1, in some embodiments, the cartridge, container or other fluid source **140** can be configured to be re-used over a period of time. For example, the distal end **142** of the cartridge **140** can be protected between uses by a cap or other sealing member **150**. Thus, the rollerball **144** of the cartridge **140** can be protected when not in use. The cartridge **140** can be re-used between various treatment procedures by a professional. In some embodiments, the cartridge **140** can be provided to the subject for application of fluid at home between visits to a professional.

In any of the embodiments disclosed herein or variations thereof, the tip and/or the entire handpiece assembly (e.g., especially in arrangements where the tip is not removable from the rest of the handpiece assembly) can be disposable. Thus, the tip can be configured for a single use prior to disposal. Accordingly, the tip can include one or more thermoplastic and/or other materials that are well suited for a single use application. Alternatively, the tip and/or other components of the assembly can include one or more metals, alloys, other rigid and/or semi-rigid materials and/or other materials that enable a user to re-use such items, as desired or required. For example, metallic and/or alloy-based tips (e.g., comprising stainless steel, titanium, platinum, etc.) can be configured to be autoclaved and/or otherwise sterilized between uses.

FIG. 1 illustrates the device being capped along its distal end using a cap or other enclosure **150**. As shown, such a cap or other enclosure **150** can help isolate the rollerball and/or other distal member (e.g., wicking member, absorptive member, etc.) from the surrounding environment. This can be helpful when the handpiece assembly **100** is not in use to ensure that contaminants and/or other substances do not taint the rollerball, another member that facilitates delivery of fluids and/or other materials to the tip and/or other portion of the distal end of the assembly **100** that may contact a targeted skin surface.

FIG. 2 illustrates a different embodiment of an assembly **200** configured for skin treatment. The assembly **200** is similar to the one depicted in FIG. 1 and described above; however, the rollerball **214** in the assembly **200** of FIG. 2 is positioned along the distal end **212** of the handpiece **210**, instead of the cartridge **240**. As with other embodiments disclosed and illustrated herein, the handpiece can be configured to receive a tip **220** along the distal end **212** of the handpiece **210**. The distal end **212** of the handpiece **210** with the rollerball **214** can be configured to pass through the interior of the tip **220** and extend toward a central opening **222** of the tip. Thus, as the assembly **200** is moved relative to a skin surface, the rollerball **214** can at least partially engage the skin surface, and with movement along such skin surface, can help deliver fluids from a cartridge or other fluid source **240** to the subject's skin. As discussed above with reference to the embodiment illustrated in FIG. 1, the

delivery of fluids to the skin surface can be facilitated, in certain configurations, with the application of suction or vacuum. In addition, the cartridge, container or other fluid source **240** can include a cap or other enclosure member **250** that is configured to be secured to the distal end of the cartridge **240**. Although in the depicted arrangement the cartridge **240** does not include a rollerball along its distal end, the cap **250** can ensure that the contents of the cartridge and/or other portions of the cartridge **240** that may be exposed to contamination are kept clean and are otherwise protected between uses.

Further, as noted above, the tip **220** can include one or more abrasive features, surfaces and/or the like such that when the tip is moved relative to a targeted skin surface (e.g., especially upon activation of a vacuum source that draws the tip toward and/or engaged with the targeted skin surface), at least portions of the targeted skin surface can be selectively abraded or otherwise removed. For example, in some arrangements, the peripheral lip of the tip **220** can be configured to at least partially abrade or otherwise remove skin tissue when the assembly **200** is moved relative to a subject's skin surface. Such abrasive features or designs can be incorporated into any embodiments disclosed herein or variations thereof.

FIG. 3 illustrates an exploded perspective view of yet another embodiment of an assembly **300** that can be used to perform a skin treatment procedure. As shown, and similar to other configurations depicted herein, the assembly **300** can comprise a cartridge **340**, a handpiece **310** that is sized, shaped and otherwise configured to receive a cartridge and a distal tip **320**. The various components of the assembly **300** can be configured to removably secure to each other. However, in other embodiments, the two or more of the components can be permanently or semi-permanently secured to each other (e.g., so as to form a monolithic or unitary structure). Such a configuration, wherein two or more portions form a unitary or monolithic structure, can be incorporated into any of the embodiments disclosed herein or variations thereof.

With continued reference to FIG. 3, unlike the configurations depicted in FIGS. 1 and 2, the rollerball and/or other member (e.g., absorptive member, wicking member, porous member, etc.) **324** is positioned along the tip **320**. Thus, in some embodiments, the rollerball **324** is configured to be in fluid communication, directly or indirectly, with an internal reservoir or other fluid-containing portion of the cartridge, container or other fluid source **340**. For example, in some arrangements, the rollerball **324** of the tip **320** is configured to receive fluid from the cartridge **320** via one or more passages, channels or other intermediate fluid reservoirs or members that extend at least partially from the cartridge **340** to the tip **320**. As with other embodiments disclosed herein, the cartridge **340** can be re-used in different treatment procedures. For example, the subject can be provided with any unused cartridges **340** following a visit to a professional. Thus, depending on the particular skin treatment protocol being used, the subject can simply bring one or more unused cartridges **340** to the next scheduled treatment procedure and/or can be apply certain fluids to his or her skin between visits, as desired or required by a particular treatment protocol.

FIG. 4 illustrates an exploded perspective view of an assembly **400** that is a variation of the arrangement depicted in FIG. 1. As in FIG. 1, the depicted assembly **400** comprises a cartridge **440** having a rollerball **444** along its distal end. The cartridge, container or other fluid source **440** is sized, shaped and otherwise configured to be inserted and secured,

at least partially, within a corresponding recess or opening along the proximal end of a handpiece **410**. As with the embodiment of FIG. 1, the rollerball **444** along the distal end of the cartridge, container or other fluid source **440** can extend to, near and/or past the distal opening **412** of the handpiece **410**. Accordingly, as the assembly **400** is moved relative to a skin surface of a subject, the rollerball **444** can at least partially contact the skin surface and rotate, thereby drawing out fluid, either directly or indirectly, from the cartridge or other fluid source **440**. In some embodiments, as discussed herein, contact between the rollerball **444** and the skin surface and/or the drawing of liquid toward the skin surface is facilitated by the activation of a vacuum or suction force along the tip **420**. For example, a peripheral lip **424** of the tip **420** can extend outwardly so as to contact skin tissue and circumscribe an interior region of the tip during use. The lip **424** can, therefore, be used to create a complete or partial seal with the skin surface being treated during use. Accordingly, in such configurations, once a vacuum or suction force is activated, skin located within an interior of the peripheral lip **424** of the tip **420** can be at least partially drawn into toward the assembly to facilitate and/or enhance contact between the rollerball **444** and the skin surface. Also, as noted herein, such embodiments that utilize suction can help deliver or enhance the delivery of fluids from the cartridge or other fluid source **440** to the tip. Further, as discussed in greater detail herein, the peripheral lip **424** and/or any other member (e.g., one or more interior members or portion of the tip, such as, posts, other cylindrical members, spiral members, abrasive pads and/or the like) can be used to at least partially abrade skin tissue as the tip is moved relative to a targeted skin surface.

As illustrated in FIG. 4 and discussed in greater detail herein, the tip can include one or more abrasive members or features **422**. For example, such abrasive members or features **422** can comprise one or more sharp edges or surfaces, spiral members, posts, grit or other roughened members or surfaces and/or the like. As noted above, for any of the embodiments disclosed herein or variations thereof, the peripheral lip can be shaped and otherwise configured to abrade tissue. Additional details regarding the various abrasive members or features that can be incorporated into the tip to help exfoliate a subject skin are provided in U.S. patent application Ser. No. 11/392,348, filed on Mar. 29, 2006 and issued as U.S. Pat. No. 8,048,089 on Nov. 1, 2011, the entirety of which is incorporated by reference herein.

Further, in any of the embodiments disclosed herein or variations thereof, one or more materials can be positioned on, which, along and/or near the tip. In some arrangements, such materials are positioned along a cavity or similar retention member (e.g., an interior of a post or other interior member, another cavity or member along or near the tip, etc.), as desired or required. Such materials can be configured to at least partially dissolve or otherwise be released in the presence of water, other liquid or fluid and/or another diluting agent. In some embodiments, such materials are stored in porous or absorptive members and are configured to at least partially release from such members in the presence of a liquid. Accordingly, in such configurations, the various serums and/or other treatment materials that are desired to be delivered to a subject's skin surface for a particular treatment protocol can be embedded or otherwise located along or near the tip. Water, saline and/or another diluting agent can be advantageously delivered to the tip to selectively dilute and release the serums and/or other treatment materials to the subject skin. Additional details regarding positioning dissolvable or otherwise releasable materials

on or near the tip of an assembly are provided in U.S. patent application Ser. No. 11/392,348, filed on Mar. 29, 2006, and issued as U.S. Pat. No. 8,048,089 on Nov. 1, 2011, and U.S. patent application Ser. No. 12/832,663, filed on Jul. 8, 2010 and issued as U.S. Pat. No. 8,814,836 on Aug. 26, 2014, the entireties of both of which are hereby incorporated by reference herein.

Another variation of an assembly **500** that comprises a rollerball **524** to facilitate the delivery of fluids to a skin surface is illustrated in FIG. 5. As shown, the assembly **500** comprises a cartridge or other fluid source **540** that is configured to be positioned within a corresponding recess or area along the proximal end of a handpiece **510**.

In addition, as discussed herein with reference to other embodiments, a removable tip **520** can be configured to be secured to the distal end of the handpiece **510**. In the depicted embodiment, the tip **520** comprises both a rollerball **524** and an abrasive surface or structure **522**. Thus, in such a configuration, moving the assembly **500** relative to a skin surface of a subject can assist with the delivery of fluids to the skin surface, while causing skin tissue to be abraded or exfoliated.

A side cross-sectional side view of another embodiment of a skin treatment assembly **600** comprising a rollerball **624** is illustrated in FIG. 6A. As shown, the cartridge or other fluid source **640** can be sized, shaped and otherwise configured to be positioned within a recess or other opening of the handpiece **610**. In the illustrated embodiment, the rollerball **624** is positioned along a distal end of the cartridge **640**. However, in other configurations, as discussed herein with reference to FIGS. 2, 3 and 5, the rollerball can be positioned on the handpiece or the tip, as desired or required.

With continued reference to FIG. 6A, the cartridge **640** can include a tapered portion **648** along its distal end. Such a tapered portion can include two or more vanes, baffles and/or other separation members **646** that increase the surface area of the fluid channel or conduit of the cartridge **640** along the end of the cartridge near the rollerball **624**. The vanes or baffles **646** can help maintain liquid contained within the cartridge **640** near the distal end of the cartridge **640**. For example, such features can help retain liquids therein as a result of the surface tension of the liquid. Accordingly, in some embodiments, at least a volume of liquid can be maintained at or near the distal end of the cartridge **640**, and thus the rollerball **624**. In some arrangements, therefore, a minimum volume of liquid and/or other material contained within the cartridge **640** can be positioned adjacent the rollerball **624** to permit such liquid and/or other material to be selectively delivered to the skin when the assembly **600** is moved relative to the subject's skin surface. In some embodiments, for example, at least some volume of liquid can be disposed at or near the distal end of the cartridge regardless of the exact orientation of the assembly (e.g., when gravity tends to move the liquid away from the distal end of the cartridge).

As illustrated in FIG. 6A, the cartridge **640** can be sized, shaped and configured to extend past the distal end of the handpiece **610**. In some embodiments, the distal end of the cartridge **640** can extend partially or completely within and/or through a tip **620** that is secured to the distal end of the handpiece **610**. In the illustrated embodiment, the rollerball **624** extends past the distal end of the tip **624**. However, in other arrangements, the rollerball **624** is flush (or generally flush) with or recessed relative to the distal end of the tip **624**.

Further, as shown in FIG. 6A, the tip **624** can comprise one or more vacuum or suction ports and passages **628** that

place the distal end of the tip **624**, and thus, the assembly **600**, in fluid communication with a vacuum source (not shown). The tip **624** can include one, two or more suction ports and/or passages **628**, as desired or required. The quantity, size, shape, orientation and/or other details about any suction ports/passages **628** included on a tip can vary, depending on the particular design. As depicted in the cross-sectional view of FIG. **6A**, the suction ports and passages **628** can be configured to be fluid communication with one or more vacuum or suction conduits or passages **V** of the handpiece **610**. The vacuum or suction conduit(s) **V** can be positioned within an interior portion of the handpiece **610**, as illustrated in FIG. **6A**. However, in other embodiments, the vacuum or suction conduit(s) can be located along an exterior of the handpiece **610** and/or any other portion of the assembly **600**, as desired or required.

Regardless of the exact properties and details of the various components of an assembly's vacuum or suction system (including, e.g., the suction ports and/or passages **628**, the suction conduit **V** and/or the like), once activated, the vacuum or suction system can be configured to generate, either intermittently or continuously, a vacuum force along the distal end of the tip **628**. In some embodiments, such a vacuum force can help draw skin toward the tip **628**, can facilitate with the delivery of fluids from the cartridge or other container **640** toward the skin and/or provide other benefits.

Another embodiment of an assembly **600B** is illustrated in FIG. **6B**. As shown, and similar to the embodiment of FIG. **6A**, the depicted assembly **600B** comprises a handpiece **610B** that is configured to receive a tip **620B** along its distal end. In some embodiments, the tip **620B** can be removable from the handpiece **610B**. However, the tip can be permanently or semi-permanently attached to the handpiece **610B** (or can form a unitary or monolithic structure with the handpiece **610B**). Further, as with other embodiments disclosed herein, a cartridge or other fluid source **640B** can be configured to be secured within a portion (e.g., recess, cavity, etc.) of the handpiece **610B**.

With continued reference to FIG. **6B**, the distal end of the cartridge **640B** can comprise one or more rollerballs **644B**. In some embodiments, once properly secured to (e.g., within) the handpiece **610B**, the distal end of the cartridge **640B** and the rollerball **644B** positioned on or near the distal end will extend to, near and/or through a central opening **612B** along the distal end of the handpiece **610B**. Likewise, the tip **620B** can comprise an opening to permit the rollerball **644B** to at least partially contact a subject's skin surface when the assembly **600B** is moved relative to such a skin surface during use. For example, the tip **620B** can include a central opening that is aligned with the rollerball **644B** and provides direct access between the rollerball **644B** and the distal end of the tip. Thus, as with other assembly arrangements disclosed herein, once the assembly **600B** is moved along a subject's skin, the rollerball **644B** can rotate to facilitate the delivery of fluids and/or other materials from the cartridge **640B** to the tip **620B**. For example, the rollerball **644B** can be in fluid communication with one or more interior portions of the cartridge **640B**.

According to some embodiments, the assembly **600B** can be configured for the delivery of a vacuum or suction force along the tip **620B**. As shown in FIG. **6B**, the handpiece **610B** can comprise a suction conduit **619B** that extends from the exterior surface of the handpiece **610B** and is configured to be placed in fluid communication with a vacuum source **V** (not shown). In some embodiments, however, as discussed herein with reference to FIG. **6A**, for

example, the suction or vacuum conduit or other hydraulic components can be routed through an interior of the handpiece **610B** or other portion of the assembly **600B**. For any of the embodiments disclosed herein or variations thereof, however, an assembly may not be configured for placement in fluid communication with a vacuum or suction source.

FIG. **7** illustrates another embodiment of a skin treatment assembly **700** comprising a rollerball to facilitate the delivery of fluids from a cartridge or other reservoir **740** to the tip **720** when the assembly **700** is moved relative to a subject skin surface. As shown, the assembly **700** can include a waste container or compartment **760** that is configured to receive any spent fluids and/or debris (e.g., exfoliated skin) that are removed from the tip **720**. For example, in some embodiments, the waste container **760** can be in fluid communication with a vacuum or suction source to assist in drawing waste (e.g., spent fluids, exfoliated skin, other debris, etc.) away from the tip and the skin surface during a treatment procedure. Thus, as discussed with respect to other embodiments illustrated and described herein, one or more suction ports, passages, conduits, valves and/or other hydraulic components can be positioned between the tip and the waste container **760**. In the arrangement illustrated in FIG. **7**, the waste compartment is incorporated (e.g., removably) within the assembly **700**. However, in other embodiments that include a suction or vacuum system, the waste can be delivered to a container, compartment or other collection point that is not incorporated within the assembly. For example, one or more vacuum conduits (e.g., tubing) can be used to deliver waste materials (e.g., exfoliated skin, spent fluids, etc.) to a separate container.

FIG. **8** illustrates a front view of a tip **820** that is configured for use with one or more of the skin treatment assemblies disclosed herein or variations thereof. As with other arrangements illustrated and described herein, the tip **820** can include one or more rollerballs **824** that are configured to facilitate the delivery of fluids from a fluid source (e.g., a cartridge) to the tip and skin surface of the subject being treated when the assembly is moved relative to the subject's skin during use.

With continued reference to FIG. **8**, the tip **820** can include a peripheral lip **822** that defines an interior region. In some embodiments, the lip **822** is sized, shaped and otherwise configured to contact the skin surface during use (e.g., whereas an interior region of the tip defined by the lip **822** is generally recessed relative to the distal end of the lip). As shown, the tip **820** can include one or more posts, other interior members and/or other abrading members or structures **826** (e.g., ridges, spiral-shaped members, other sharp surfaces, gritty or abrasive members, etc.) to help in the exfoliation of skin tissue as the tip is moved relative to a subject's skin. In some embodiments, however, the peripheral lip **822** can be configured to exfoliate skin tissue as the assembly is moved relative to a subject's skin surface during use, either in addition to or in lieu of any abrasive structures or members **826** positioned along an interior region of the tip **820**.

With continued reference to FIG. **8**, the tip can include one or more vacuum or suction ports **828a**, **828b** through which waste materials (e.g., spent fluids, exfoliated skin, other debris, etc.) can pass when the assembly's suction system is activated. The quantity, size, shape, spacing, orientation and/or other properties of the vacuum or suction ports **828a**, **828b** can be different than illustrated in FIG. **8**, as desired or required by a particular design or application.

Further, as discussed in greater detail herein, the clearance or spacing between the rollerball **824** and the adjacent base

surface **827** of the tip **820** can vary. For example, in some embodiments, such a clearance is about $\frac{1}{128}$ to $\frac{1}{2}$ inch. The rollerball **824** can be located within a housing that permits the rollerball to freely rotate and prevent the rollerball from being separated or otherwise removed from the tip during use. As noted herein, in some embodiments, the rollerball can be selectively removable from a particular housing of the tip, handpiece and/or cartridge (depending on which component of an assembly the rollerball is secured) for replacement, cleaning, maintenance and/or the like.

In any of the embodiments, disclosed herein, an assembly can include one, two or more rollerballs to facilitate the delivery or transfer of fluid from a cartridge, reservoir or other fluid source to the tip and the skin surface of a subject. The rollerball can be positioned along the longitudinal centerline of the assembly; however, in some arrangements, the rollerball is offset from the longitudinal centerline, as desired or required. Further, the rollerball can include one or more materials, such as, for example, metals or alloys (e.g., stainless steel, brass, titanium, etc.), thermoplastics and/or any other synthetic or natural material. The diameter (or other cross-sectional dimension) of the rollerball can be approximately $\frac{1}{4}$ inch to 2 inches. However, in other embodiments, the diameter or other cross-sectional dimension of the rollerball, wicking member and/or other member positioned along the distal end of a handpiece can be smaller than $\frac{1}{4}$ inches or greater than 2 inches, as desired or required.

According to some embodiments, the rollerball can include a solid (e.g., non-porous) structure or a porous structure, as desired or required. In any of the embodiments disclosed herein, the rollerball can include one or more coatings or other materials. For example, the rollerball can include one or more layers of dissolvable materials that are configured to dissolve and thus be released to the skin surface being treated in the presence of water or another diluting agent. In some arrangements, a rollerball comprises a porous structure that is at least partially saturated with one or more substances that are configured to be released (e.g., dissolve) during use. Such materials can be located, at least initially, within an interior portion of the rollerball. As discussed herein, the rollerball can be included in a system that is configured to generate a vacuum or suction at or near the tip, thereby enhancing the effect of using a rollerball or similar structure to engage targeted skin and/or delivery fluids to the skin surface. Further, the rollerball can be positioned adjacent a wicking member, porous member and/or other member that is configured to retain liquid. This can assist in ensuring that the rollerball maintains a certain degree of moisture, regardless of whether liquid would be otherwise immediately present at or near the rollerball.

In any of the embodiments disclosed herein, the rollerball and/or wicking member can comprise one or more abrasive and/or other roughened or sharp surfaces or features. Such embodiments can facilitate exfoliation of skin as the handpiece is moved along a subject's skin surface.

Another embodiment of a skin treatment assembly **900** comprising a rollerball is illustrated in FIGS. **9A** and **9B**. Unlike other arrangements disclosed herein, the depicted assembly **900** includes a handpiece and a tip that are integrated into a single unitary or monolithic structure **910**. In some embodiments, such a combined handpiece and tip can be configured to be disposable so it is replaced between uses. According to some embodiments, the assembly **900** comprises a cartridge or other fluid source **940** that is configured to secure to the combination handpiece/tip **910**.

With continued reference to FIG. **9B**, the distal end **942** of the cartridge **940** can include a rollerball **944** that is routed through an interior portion of the combination handpiece/tip **910** when the cartridge **940** is positioned therein. In some embodiments, the rollerball **944** extends to or near the distal end of the combination handpiece/tip **910** when the assembly **900** is ready for use. Accordingly, as the assembly **900** is moved relative to a subject's skin surface, the rollerball can at least partially contact the skin surface being treated and rotate. Rotation of the rollerball **944** can facilitate the transfer of fluid and/or other contents of the cartridge **940** to the distal end of the combination handpiece/tip **910**, and thus, the skin surface.

As shown in FIGS. **9A** and **9B**, the proximal end **945** of the cartridge **940** can include a closure member **946** that sealingly encloses an interior of the cartridge **940**. Thus, in some embodiments, the interior of the cartridge **940** can be opened, refilled and closed. However, in other arrangements, the cartridge **940** is configured to remain sealed at all times. Thus, in such configurations, the cartridges are disposable after use. The above disclosure regarding cartridges that can be opened and cartridges that are configured to remain sealed can be applied to any of the assembly arrangements disclosed herein or variations thereof.

As discussed above with reference to other embodiments, the cartridge **940** included in the assembly **900** of FIGS. **9A** and **9B** can be re-used between sequential treatment procedures. For example, once the subject has completed a particular treatment session, the subject can be permitted to take home any used cartridge or cartridges (to the extent two or more different serums or other treatment materials were used). Thus, the subject can bring the unused cartridges to a subsequent treatment session, thereby eliminating waste and reducing the overall expense of a procedure. In some embodiments, the subject can be instructed to apply one or more of the serums and/or other materials contained within the corresponding unused cartridges **940** to his or her skin between office visits. Accordingly, in order to prevent contamination of the cartridges and their internal contents, to prevent evaporation, leaks or other loss of the internal contents of the cartridges, to otherwise protect the cartridges (e.g., the rollerball **944** located along the cartridge's distal end) and/or to provide one or more additional benefits or advantages, a cap **950** can be used to protect the distal end **942** of a cartridge between uses. The rollerball **944** can facilitate the application of fluid to the subject's skin surface between office visits. For example, the use of a rollerball can advantageously permit fluid to be delivered from the interior of the cartridge **940** to the subject's skin surface without the use of suction or a handpiece. Thus, the overall effectiveness of a skin treatment procedure can be advantageously enhanced by such embodiments.

In some embodiments related to the treatment of acne, for example, two main serums or materials can be used during a treatment procedure. Thus, during a first visit to a professional, the subject undergoes a two-step treatment procedure in which an acidic formulation (e.g., salicylic acid) is first applied to the subject's skin surface (e.g., with or without the application of vacuum) to remove impurities and clear out the subject's pores. As a follow-up step, an antibiotic or other treatment serum is applied to the skin. In some embodiments, as discussed herein, the user is then provided with cartridges or other fluid containers. Such cartridges can be advantageously returned to the professional for conducting a follow-up procedure during a subsequent visit. In addition, the subject can be instructed, in accordance with

certain protocols, to periodically apply one or more of these serums or fluids to his or her skin between visits, as desired or required.

As noted above, the combination handpiece/tip **910** included in the assembly of FIGS. **9A** and **9B** can be disposable between uses or sequential procedures. Thus, the use of such a disposable portion can reduce the likelihood of the transfer of contamination between subjects and/or procedures, thereby improving the overall hygiene and safety of skin treatment procedures.

With continued reference to FIGS. **9A** and **9B**, the combination handpiece/tip **910** can include a suction port or conduit **918** that is configured to be placed in fluid communication with a vacuum source. In the illustrated embodiment, suction port **918** extends along an exterior of the handpiece/tip component **910** (e.g., at an angle); however, in other arrangements, the suction port or conduit **918** can extend, at least partially or completely, within an interior of the assembly **900**, as desired or required. In yet other embodiments, the assembly **900** is not configured to be placed in fluid communication with a suction or vacuum source. Accordingly, in such arrangements, the assembly need not have any suction or vacuum ports, passages, conduits and/or other related components or features.

In any of the embodiments disclosed herein, including those illustrated in FIGS. **1-9B**, the rollerball or similar feature along the distal end of a cartridge, handpiece and/or tip can be replaced with one or more other features that to help to selectively deliver fluid to the skin surface being treated (e.g., from a reservoir of a cartridge or other container placed in fluid communication with the system). For example, as illustrated in the embodiment of FIG. **10**, the rollerball can be replaced with a wicking or other fluidly porous member **1044** along its distal end.

With reference to FIG. **10**, the distal end **1042** of the cartridge **1040** can include a wicking member or other porous member **1044**. In some embodiments, the rollerball **944** extends to or near the distal end of the combination handpiece/tip when the assembly is ready for use. Accordingly, as the assembly is moved relative to a subject's skin surface, the wicking member **1044** can at least partially contact the skin surface being treated and deliver fluid from the fluid reservoir of the cartridge or other container **1040** to the skin surface. The wicking member **1044** can comprise one or more porous materials or features, such as, for example, foam, a porous stone, sponge or other member, another material or member comprising a porous or otherwise open or semi-open structure. In some embodiments, the wicking or other porous member **1044** can be saturated with the particular fluids contained within the reservoir of the cartridge or other container member. Thus, the wicking member **1044** can retain the necessary moisture level to selectively deliver fluid to the skin surface treated, even when the level of fluid within the cartridge or the other container **1040** is relatively low.

With continued reference to FIG. **10**, the wicking member **1044** can comprise one or more foams, thermoplastics and/or other materials. The cross-sectional size of the wicking member can be between $\frac{1}{4}$ inch and 2 inches. In some embodiments, the wicking member **1044** extends, at least partially, within the interior reservoir of the cartridge or other container. The wicking member **1044** can include any cross-sectional shape, as desired or required, such as, for example, circular, oval, square or other rectangular, other polygonal (e.g., triangular, pentagonal, hexagonal, octagonal, decagonal, etc.), irregular.

FIG. **11** schematically illustrates a skin treatment system **1000** similar to the system depicted in FIG. **10**. As shown, the system **1000** can include a cartridge or other container **1040** comprising a wicking or other porous structure **1044** along its distal end. The wicking or other porous structure can include one or more materials that are configured to at least partially absorb, adsorb and/or otherwise retain a volume of liquid or other material. As discussed herein, according to some embodiments, such a wicking structure **1044** can be used to keep the distal end of the cartridge **1040** at least partially moist for purposes of delivering fluids and/or other materials to the skin surface of a subject during a particular procedure.

According to some embodiments, the wicking or other porous structure **1044** incorporated into any of the embodiments herein (e.g., the distal end of a cartridge or other container, the handpiece, the tip, etc.) can be used for one or more purposes. For example, in some embodiments, the wicking material can be used to perform one or more of the following functions: (i) to store one or more materials within a portion of a skin treatment assembly (e.g., along a distal end of a cartridge, along a tip of an assembly, along a handpiece, etc.); (ii) as a filter (e.g., for waste debris leaving the skin surface being treated); (iii) for delivering fluids and/or other materials to the skin surface being treated; and/or the like. For example, in one embodiment, a wicking or other porous material **1044** can include a treatment material (e.g., as a liquid, gel, powder, etc.). Water or another dilution agent can then be delivered to or near the wicking or porous member **1040** to selectively release the materials stored within the wicking or other porous member.

According to some embodiments, as schematically illustrated in FIG. **12**, a rollerball or other movable member **1146** can be positioned along the distal end of a wicking or other porous member or structure **1144**. In such a system **1100**, the wicking member **1144** and rollerball **1146** can be positioned along the distal end of a cartridge **1140**. Alternatively, as with other configurations disclosed herein, the wicking member **1144** and/or the rollerball **1146** (or combination thereof) can be located along the handpiece, the tip and/or any other location of the skin treatment assembly. In such embodiments, the rollerball **1146** can be kept in fluid communication with the fluid contained within the cartridge or other container with the assistance of the wicking member or structure. In other words, the proximal end of the rollerball can be advantageously maintained moist with the assistance of the wicking material. Thus, for example, if the handpiece is being handled such that the liquid would be away from the rollerball **1146**, the wicking or porous member helps to ensure that a certain degree of liquidity or moisture is maintained adjacent the rollerball or other movable member. This can help promote a more consistent application of liquid to the skin surface.

FIG. **13A** illustrates schematically a tip **1200** that is configured to be positioned along the distal end of a skin treatment system. As shown and discussed in greater detail in one or more applications incorporated by reference herein, the tip **1200** can include a peripheral lip **1222** that is configured to contact skin tissue and form a seal during use (e.g., to help deliver fluids to the skin surface upon the application of vacuum or suction to the assembly). With continued reference to FIG. **13A**, the tip **1200** can also include a recessed base **1224** from which one or more abrading members or structures **1226** extend. For example, such abrading members or structures can include one or more posts, spiral ridges and/or the like. Regardless of their exact shape, structure and/or other properties, such abrading

members or structures **1226** can include a sharp or abrading edge or structure to facilitating the abrasion of skin tissue during use.

As shown schematically in FIGS. **13B** to **13D**, one or more wicking or porous structures or members **1250** can be advantageously positioned along, near or within a portion of the tip **1200**. Such wicking or porous members **1250A**, **1250B**, **1250C** can include within their structures one or more materials that are intended to be released to the skin surface during use (e.g., when a dilution agent is delivered to the tip). For example, as shown in FIG. **13B**, the wicking or porous member **1250A** can be positioned along one or more posts or other protruding members **1226** of the tip. In other embodiments, as shown in FIG. **13C**, the wicking or porous member can be positioned along the underside of the base **1224**, but can still be in fluid communication with a dilution agent (e.g., water) that is selectively delivered to the tip. In such arrangements, the wicking member **1250B** can comprise a disk or other component that fits within or other portion of the tip (e.g. friction fit, using one or other fasteners or other retaining members, etc.). In yet other embodiments, as shown in FIG. **13D**, the wicking member **1250C** can be positioned along one or more recesses of the base **1224** and/or other portion of the tip **1200**.

FIG. **14** illustrates a perspective view of a skin treatment assembly **1300** that comprises a unitary structure **1340** along its proximal end that is configured to releasably secure to a proximal handpiece portion **1310**. In some embodiments, such a unitary structure **1340** comprises one or more compartments or portions. For example, one compartment or portion of the structure **1340** can be used to store a fluid or other treatment material that is intended to be selectively delivered to a skin surface via the handpiece **1310** and the distal tip **1320**. Further in some embodiments, the structure **1340** can include one or more additional compartments or portion. In one embodiment, for instance, such an additional compartment can include a waste compartment that is configured to receive spend fluids, abraded skin and/or other debris removed from the skin surface being treated. Additional details regarding such assemblies are provided in U.S.

Pat. No. 8,343,116, filed as U.S. patent application Ser. No. 12/346,582 on Dec. 30, 2008 and issued on Jan. 1, 2013.

FIG. **15** schematically illustrates one embodiment of an assembly similar to the one discussed herein with reference to FIG. **14**. As shown, in some embodiments, a wicking materials or other porous structure **1349** can be positioned along the interior of the waste compartment **1346** of a unitary structure **1340**. The wicking or other porous structure can help absorb the waste materials within its structure to facilitate the use of a handheld device, especially one (like in FIG. **14**) that incorporates a waste structure at its proximal end. In other words, the wicking material **1349** can help ensure that the waste fluids and/or other waste materials do not disadvantageously move within the compartment **1346** during use. In addition, such a configuration can assist with the removal and/or disposal of the waste contents from the waste compartment. For example, in some embodiments, the wicking and/or other porous member can be easily removed and discarded without having to deal with loose fluids.

In some embodiments, as illustrated schematically in FIG. **15**, a hydrophobic member **1343**, **1347** can be advantageously placed along a portion of the fluid retention compartment **1342** and/or the waste compartment **1346** to facilitate the passage of air into and/or out of the compartments **1342**, **1346** during use. For example, such members **1343**, **1347** can act as one way valves that permit air to pass therethrough (e.g., to prevent or reduce the likelihood of vacuum forces from forming within the respective compartments), while not allowing liquids and/or other materials from passing.

According to some embodiments, the various systems disclosed herein can be used to treat one or more skin conditions of a subject. For example, the systems can be used to target the following conditions/target treatments: acne, skin lightening, skin tightening, anti-aging, oily skin, lip repair/plumping and/or the like. Example treatment protocols for at least some of the conditions/target treatments are provided below. For example, in some arrangements, protocols identical or similar to those provided in Table A below can be used.

TABLE A

| Protocol/Procedure | Step 1 Fluid Active Ingredients | Step 2 Fluid Active Ingredients | Step 3/4 Fluid active ingredients |
|--------------------|--|--|--|
| Acne | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin | Treatment agent (e.g., anti-oxidants, silver, in combination with one or more agents such as benzyl peroxide, Salicylic acid or sulfur. | A treatment agent consisting of oil free moisturizing agents combined or applied separately with agents to block UV rays and other oxidizing elements. |
| Skin lightening | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin | A treatment agent consisting of but not limited to, avena sativa (oat) kernel extract, Palmaria palmata, horsechest nut and green tea extract. | A treatment agent consisting of moisturizing agents combined or applied separately with agents to block UV rays and other oxidizing elements. |
| Skin tightening | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead | A treatment agent consisting of but not limited to, avena sativa (oat) kernel | A treatment agent consisting of moisturizing agents combined |

TABLE A-continued

| Protocol/Procedure | Step 1 Fluid Active Ingredients | Step 2 Fluid Active Ingredients | Step 3/4 Fluid active ingredients |
|--------------------------------------|---|---|---|
| | tissues on the surface layers of the skin. | extract, Palmaria palmata, horsechest nut and green tea extract. | or applied separately with agents to block UV rays and other oxidizing elements. |
| Anti-aging | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin. | A treatment agent consisting of but not limited to transdermal application of antioxidants, such as but not limited to, lipoic acid bioflavonoid, (aesculus hippocastanum) horse chestnut, proanthocyanidin and a mixture of amino acids combined with sulfur and or benzyl alcohol or other penetrant enhancers. | A treatment agent consisting of moisturizing agents combined or applied separately with agents to block UV rays and other oxidizing elements. |
| Oily skin | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin | Treatment agent (e.g., anti-oxidants, silver, in combination one or more agents such as benzyl peroxide, Salicylic acid or sulfur. | A treatment agent consisting of oil free with moisturizing agents combined or applied separately with agents to block UV rays and other oxidizing elements. |
| Lip Repair/Plumping | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin | Treatment agent (e.g., anti-oxidants and collagen building Ingredients such as but limited to amino acids such as palmitoyl dipeptide-10, palmitoyl dipeptide-1,7, palitoyl hexipeptide-12. | A treatment agent consisting of moisturizing agents combined or applied separately with agents to block UV rays and other oxidizing elements. |
| Anti-oxidant/growth factor treatment | Preparatory/Exfoliating agent with salicylic acid or other agent that will breakdown oils and dead tissues on the surface layers of the skin | Apply Epicatechin (e.g., synthetic and/or naturally derived) and/or other growth factor(s). In some embodiments, allow sufficient time to dry before continuing to the next step. In some arrangements, could Epicaeichin be in a powder form that needs to be mixed just prior to application | Antioxidant(s) and/or other agents. In some embodiments, the process can include the application of additional agents, such as, e.g., sunscreen(s), as a follow up step. In one embodiment, the sunscreen can be 30SPF or greater |

60

According to some embodiments, with reference to the Epicatechin treatment listed above can be included in a take home unit, as described in greater detail herein. In some embodiments, the Epicatechin product is applied daily morning and/or night. The Epicatechin could be provided in the form of a lotion, cream or serum, wax lipstick delivery medium and/or the like. In some embodiments, antioxidant

product(s) is/are applied daily morning and/or night Like the Epicatechin product, antioxidants could be provide as a lotion, cream or serum, wax lipstick delivery medium and/or the like, as desired or required.

65 For example, as indicated in Table A above, in some embodiments, the initial step of a treatment protocol comprises one or more preparatory steps or procedures. For

example, in some arrangements, the subject's skin is initially exfoliated, at least partially, regardless of the exact protocol being used. In some configurations, salicylic acid or other agent that will breakdown oils and dead skin tissue on the surface layers of the subject's skin can be selectively delivered to the skin of a subject. The delivery of such preparatory fluids can be performed using a device disclosed herein (e.g., a vacuum-assisted assembly). Alternatively, such materials can be delivered to the skin surface using one or more other methods or devices (e.g., topically applied without the use of separate device). In some embodiments, the delivery of fluids while suction is applied to the skin (e.g., via a suction-enabled assembly) can facilitate the delivery of fluids below the outermost surface of the skin to thereby enhance the initial preparatory step of a procedure or protocol.

With further reference to Table A, as a second step to a treatment procedure, a first treatment agents or combination of treatment agents (e.g., anti-oxidants, silver, benzyl peroxide, salicylic acid, sulfur, avena sativa (oat) kernel extract, palmaria palmata, horsechest nut, green tea extract, lipoic acid bioflavonoid, (aesculus hippocastanum) horse chestnut, proanthocyanidin and a mixture of amino acids combined with sulfur and or benzyl alcohol or other penetrant enhancers and/or the like can be delivered to the skin via the rollerball, wicking material and/or the like.

Further, with continued reference to Table A, as a third step to a treatment procedure, a second treatment agents or combination of treatment agents (e.g., anti-oxidants, silver, benzyl peroxide, salicylic acid, sulfur, avena sativa (oat) kernel extract, palmaria palmata, horsechest nut, green tea extract, lipoic acid bioflavonoid, (aesculus hippocastanum) horse chestnut, proanthocyanidin and a mixture of amino acids combined with sulfur and or benzyl alcohol or other penetrant enhancers and/or the like can be delivered to the skin via the rollerball, wicking material and/or the like.

FIGS. 16 and 18 schematically illustrate different embodiments of a system having a handpiece or other skin treatment component configured to contact skin along one end. As discussed herein, such a handpiece or other component can comprise a rollerball, wicking members and/or the like. As shown in FIGS. 16 and 18, a conduit (e.g., vacuum tubing) can be used to place the handpiece or other treatment component in fluid communication with a vacuum source (e.g., a vacuum unit). In some embodiments, one or more both ends of the conduit can include a sensor to ensure that a satisfactory connection is made with the handpiece and the vacuum source before the system can be activated. One or more wires, conduits, cables and/or other electrical connections can be included in the system to facilitate the necessary connection to the sensor(s) and/or other electrical components. In other embodiments, the necessary electrical and/or data connections are wireless (e.g., Bluetooth). Regardless of the exact configuration, such handpiece sensing features can permit the system to operate when the electrical and/or date circuit is completed.

FIGS. 17A and 17B illustrates different embodiments of systems that comprise a cartridge assembly that is configured to at least partially absorb and/or otherwise retain waste material being removed from the skin (e.g., spent serums and/or other treatment materials, exfoliated skin, other debris, etc.). For example, in one embodiment, a cartridge assembly that is in fluid communication with a vacuum source, as depicted in FIG. 17B, can be sized, shaped and/or otherwise configured to receive a removable solid cleaning cartridge. Such a removable cartridge can be advantageously removed, discarded and replaced, thereby reducing exposure

of waste materials during routine maintenance, cleaning and/or other normal operation of the system. As shown, the receptacle into which the solid cleaning cartridge is placed can include a central conduit having a plurality of openings, pores and/or the like that place the central conduit in fluid communication with the removable cartridge. In some embodiments, as discussed in greater detail herein, such a cartridge can comprise a porous, wicking, absorptive and/or other material configured to at least partially receive and/or retain fluids and/or other materials.

FIG. 18 schematically illustrates one embodiment of a system that comprises sensors along both the handpiece and the vacuum source to ensure proper connection of conduits of the system. In some arrangements, the sensors can help identify the components that are used in the system. This can provide a level of security that the components are intended to be used with one another, and that no unintended components that can interfere with the proper function of the system are included in a particular arrangement.

FIGS. 19A and 19B illustrate different views of yet another embodiment of a skin treatment assembly 2000 comprising a rollerball (and/or another porous, wicking, other absorbent material or member, and/or the like) 2044 along its distal end 2042. As with other embodiments disclosed herein, the rollerball or other member positioned along the distal end 2044 can facilitate delivery of fluids and/or other materials to a subject being treated with the assembly 2000. In some embodiments, as illustrated in FIG. 19A, the assembly 2000 can include a cartridge or other container 2040. Further, the distal end 2010 of the assembly 2000 can include a handpiece portion 2110 that is sized, shaped and/or otherwise adapted to secure to the distal end of the cartridge 2040.

With continued reference to FIG. 19A, the handpiece portion 2110 can be configured to fit over the distal end of the cartridge or other container 2040 such that a rollerball or other member (e.g., wicking member, porous member, absorptive member, etc.) 2040 located along the distal end of the container 2040 can extend to the distal end of the assembly 2000. For example, in some embodiments, such a rollerball or other member 2044 can form the most distal surface of the assembly once the handpiece portion 2110 is secured to the cartridge or other container 2040. In other embodiments, however, the distal end of the rollerball or other member that is configured to facilitate delivery of fluid(s) to the skin surface of a subject is aligned with, generally aligned with or proximal to another portion of the handpiece assembly 2110 and/or another portion or component of the assembly 2000, as desired or required. Thus, in some configurations, the assembly 2000 relies, at least in part, on suction or vacuum created along the distal end of the assembly to draw the targeted skin surface toward (e.g., adjacent to, in contact with, etc.) the rollerball and/or other distal member 2044, as desired or required.

As discussed with respect to other embodiments herein, the use of vacuum or suction to help draw the tissue toward the rollerball or other distal member (e.g., wicking member, porous member, absorptive member, etc.) can help enhance a skin treatment procedure. For example, the ability to selectively delivery fluids and/or other substances or materials (e.g., included within the cartridge or other container that is physically coupled to and/or in fluid communication with a container, e.g., a multi-container manifold system) can be improved and/or otherwise enhanced by the use of suction or vacuum. For example, the application of a vacuum or suction force along the tip can help deliver fluids and/or other substances to the skin surface being treated at

a controlled rate of delivery. This can be contrasted with embodiments that rely only on gravity to deliver fluids and/or other materials to the skin surface. The use of a vacuum or suction force (e.g., once a seal has been created between a distal lip or periphery of a tip or other distal portion of an assembly, in accordance with various embodiments disclosed herein), can help ensure that fluid and/or other materials contained within a container (e.g., cartridge) and/or other fluid system with which the assembly **2000** is in fluid communication (e.g., a manifold system) is consistently and adequately delivered to the targeted skin surface. This is applicable to and may be specifically adapted for any of the embodiments disclosed herein.

With continued reference to FIG. **19A**, the handpiece portion **2110** of the assembly **2000** can include a port **2112** that is adapted to be coupled to a vacuum or suction source. In some embodiments, as shown in FIG. **19A**, the suction port **2112** can be positioned, at least partially, along an exterior of the assembly. However, in other embodiments, the port **2112** and/or corresponding passage (e.g., conduit) to which the port is placed in fluid communication can extend, at least partially, along an interior of the assembly. For example, in some arrangements, the port and/or the corresponding passage can extend, at least in part, along the interior of the assembly, as desired or required.

As discussed with reference to other embodiments herein, the distal end of the assembly **2000** (e.g., the distal end of the handpiece portion **2110**, the cartridge or other container **2040**, a separate tip and/or any other component or portion) can include a peripheral lip or edge that is configured to contact the subject's skin. In some embodiments, such a lip and/or other periphery can help establish a seal with the adjacent tissue surface to ensure that, when a vacuum or suction source is activated, the targeted skin surface is engaged by the lip and/or other periphery. In some arrangements, this facilitates the delivery of fluids to the tip and removal of spend fluids and/or other debris (e.g., exfoliated skin) away from the tip.

FIGS. **20A** and **20B** illustrate different longitudinal cross-sectional views of the assembly depicted in FIGS. **19A** and **19B**. As shown, the distal end of the container (e.g., a cartridge, a handpiece assembly, a tip, etc.) that includes the rollerball or other fluid delivery member (e.g., absorptive member, a wicking member, etc.) **2044**. As shown, the distal end **2042** of the assembly **2000** can be tapered and/or otherwise include a reduced diameter or cross-sectional dimension, as desired or required. For example, in some embodiments, the distal end **2010** of the assembly **2000** along or near which the rollerball or other fluid delivery member (e.g., absorptive member, a wicking member, etc.) **2044** is positioned or otherwise located can include a diameter or other cross-sectional dimension that is 20% to 70% (e.g., 20-30, 30-40, 40-50, 50-60, 60-70%, ranges between the foregoing, etc.) smaller than adjacent portions of the assembly.

With continued reference to FIGS. **20A** and **20B**, the assembly **2000** can comprise a distal end **2010** that includes a tapered portion **2042**. As shown, a rollerball or other fluid delivery member **2044** can be positioned along the distal end of the tapered portion **2042** and/or other portion of the distal end of the assembly **2000**, as desired or required. As with other embodiment disclosed herein, the rollerball or other fluid delivery member **2044** can be in fluid communication with a main portion of the reservoir or compartment that contains fluid via one or more passageways **2048** along the tapered distal end **2042**. In some configurations, the rollerball and/or other member (e.g., wicking member, porous

member, etc.) **2062** can be resiliently biased distally using one or more springs and/or other resilient members or portions **2050**. Such a configuration can be implemented in any of the embodiments disclosed herein or variations thereof.

Thus, according to some embodiments, the rollerball or other member **2044** is resiliently biased in a distal orientation. In such configurations, the rollerball or other fluid delivery member **2044** is normally configured to form a seal **2062**. As a result, in such a configuration, fluids and/or other materials (e.g., contained within a cartridge and/or otherwise in fluid communication with the rollerball or the fluid delivery member **2044**) are prevented from exiting past the rollerball or other fluid delivery member **2044**. In some embodiments, pressing or otherwise moving the rollerball and/or other fluid delivery member **2044** (e.g., wicking member, porous member, etc.) inwardly (e.g., against the force created by the spring **2050** or other biasing or resilient member) can create clearance between the rollerball or other member **2044** and the adjacent housing, thereby allowing fluid to flow around the rollerball or other member toward the distal end of the assembly **2000**.

In some embodiments, however, if sufficient force is imparted upon the rollerball or other assembly **2044**, the rollerball or other assembly **2044** can abut against a distal surface **2064** of the housing and/or other portion of the assembly to prevent further fluids and/or other materials from exiting toward the distal end of the assembly. Thus, in some embodiments, one or more resilient members (e.g., springs) **2050** can help regulate the passage of fluid from a reservoir (e.g., from within a cartridge or other portion of the assembly) to the tip of the assembly **2000**, as desired or required. In some embodiments, the force that is applied against the spring or other resilient member **2050** regulates the amount of flow (e.g., flowrate) that moves past the rollerball and/or another fluid delivery member **2044** located along the distal end of the assembly **2000**. Such a configuration can be applied to any of the embodiments disclosed herein. In some embodiments, moving the rollerball and/or any other distal member **2044** too far against the biasing force may cause the rollerball or the member to seat against a proximal portion **2064** that will once again prevent flow from to the distal end of the assembly. Thus, in some embodiments, there exists a range within which the rollerball or other resiliently-biased member **2044** can be moved in order to regulate flow to the distal end of the assembly **2000**.

As noted herein, e.g., with reference to, among other embodiments, FIGS. **10** and **11**, a handpiece assembly can include one or more wicking and/or other porous (e.g., fluidly porous) members that are configured to facilitate the delivery of fluid (e.g., water, other serum or treatment material, etc.) to the distal end (e.g., to the tip or other distal member or portion) of the handpiece assembly. Accordingly, as the handpiece assembly **3000** is moved relative to a subject's skin surface, the wicking member **3044** can facilitate the delivery of water or other fluids from a fluid source (e.g., a fluid reservoir of a cartridge or other container **3040**, another container that is secured to the handpiece assembly or is separate from the handpiece assembly, etc.) to the skin surface. The wicking member **3044** can comprise one or more porous materials or features, such as, for example, foam, a porous stone, sponge or other member, another material or member comprising a porous or otherwise open or semi-open structure. In some embodiments, the wicking or other porous member **3044** can be saturated with the particular fluids contained within the reservoir of the car-

tridge or other container member (e.g., before, during and/or after use). Thus, the porous member (e.g., wicking member) **3044** can retain the necessary moisture level to selectively deliver fluid to the skin surface treated, even when the level of fluid within the cartridge or the other container **3040** is relatively low.

As illustrated in the cross-sectional view of FIG. **21C**, the porous or wicking member **3044** extends at least partially within the container **3040** on one end and at least partially through the tip or other distal member or portion **3020**. As shown, the distal member or portion **3020** comprises a tip that is removably secured to the distal end of the cartridge or other container **3020**. However, in other embodiments, the handpiece assembly **3000** comprises a different structure or design, as desired or required. For example, the handpiece assembly **3000** can include a unitary or monolithic structure, wherein the container and the tip or other distal member or portion form a single or non-separable construction.

In some embodiments, with continued reference to FIG. **21C**, the wicking or other porous member **3044** can extend entirely or almost entirely through the length of the tip **3020** or other distal member or portion. For example, in some arrangements, the porous member **3044** extends between 50% to 100% (e.g., 50-60, 60-70, 70-80, 80-90, 90-100%, percentages between the foregoing ranges, etc.) of the length of the tip or other distal member **3020**. However, in other embodiments, the porous member **3040** extends through less than 50% (e.g., 0-10, 10-20, 20-30, 30-40, 40-50%, percentages between the foregoing, etc.) of the length of the tip, as desired or required. Thus, the wicking or porous member can draw fluid from the interior of the container **3040** and quickly and consistently deliver it to the tip **3020**. This can advantageously improve the manner in which fluids are delivered to a skin surface being treated during a procedure. In some embodiments, the use of porous members or structures like those disclosed herein can facilitate fluid transfer from a container to the skin surface irrespective of the orientation and/or position of the handpiece assembly relative to the subject's skin.

As discussed herein with reference to other embodiments, the depicted porous or wicking member **3044** can comprise one or more foams, thermoplastics and/or other materials. The cross-sectional size of the wicking member can be between ¼ inch and 2 inches or more. In some embodiments, the wicking member **3044** extends, at least partially, within the interior reservoir of the cartridge or other container. The wicking member **3044** can include any cross-sectional shape, as desired or required, such as, for example, circular, oval, square or other rectangular, other polygonal (e.g., triangular, pentagonal, hexagonal, octagonal, decagonal, etc.), irregular. In some embodiments, any of the porous members (e.g., wicking members) disclosed herein can be configured to transport liquids and/or other fluids through their structure via capillary action. In addition, the porous members (e.g., wicking members) disclosed herein can comprise one or more rigid and/or semi-rigid materials.

According to some embodiments, as illustrated in FIGS. **21A-21E**, the handpiece assembly **3000** is configured to be coupled to a vacuum or suction source (not shown). As shown, the tip **3020** and/or any other portion of the assembly **3000** can comprise one or more openings, passageways or channels **3042** that place the distal end of the tip **3020** in fluid communication with a vacuum coupling **3042**. In some embodiments, the vacuum coupling **3042** can include a luer and/or any other standard or non-standard coupling or connector. Such a coupling, irrespective of its exact design and configuration, can be adapted to couple to and be placed

in fluid communication with a vacuum conduit or line that is fluidly coupled to a vacuum or suction source (e.g., a vacuum pump). In some configurations, the passageway **3042** is configured to extend, at least partially, through an interior of the tip **3020** and/or another portion of the assembly **3000**, as shown in FIG. **21C**. However, in other embodiments, the passageway **3042** can extend, at least partially, through an exterior of the tip **3020** and/or another portion of the assembly **3000**. Further, the passageway **3042** can terminate at or near one or more ports or openings **3028** along the distal end of the tip **3020**.

In some embodiments, the tip **3020** or other distal member or portion of the assembly **3000** can include one, two or more suction ports and/or passages, as desired or required. The quantity, size, shape, orientation and/or other details about any suction ports/passages included on a tip can vary, depending on the particular design. In some arrangements, the vacuum or suction ports are located on the cartridge or other container **3040**.

In some embodiments, the suction passages or conduits **3042** terminate at the distal end of the tip or other distal member **3020**, as shown, for example, in FIG. **21C**. However, in other arrangements, the suction passages or conduits terminate proximal to the distal end of the tip or other distal portion of the assembly (e.g., before or proximal to the distal end of the tip or other distal member), as desired or required. In some embodiments, the suction passages or conduits **3042** can extend entirely or almost entirely through the length of the tip **3020**, another distal portion and/or any other portion or member of the handpiece assembly **3000**. For example, in some arrangements, the suction passages or conduits **3042** extend between 50% to 100% (e.g., 50-60, 60-70, 70-80, 80-90, 90-100%, percentages between the foregoing ranges, etc.) of the length of the tip **3020**. However, in other embodiments, the suction passages or conduits **3042** extend through less than 50% (e.g., 0-10, 10-20, 20-30, 30-40, 40-50%, percentages between the foregoing, etc.) of the length of the tip **3020**.

In some embodiments, the distal end of the tip or other distal member **3020** comprises a peripheral lip **3022** that is configured to create a partial or complete seal between the tip or other distal member and a skin surface when the tip **3022** is placed against the subject's skin during use. For example, a peripheral lip **3022** of the tip or other distal member or portion **3020** can extend outwardly so as to contact skin tissue and circumscribe an interior region **3023** of the tip during use. The lip can include a generally smooth outer surface (e.g., the outer surface that is configured to contact skin and form a seal relative to skin). In some arrangements, the use of vacuum (e.g., via activation of a vacuum or suction force, the couplings, connectors, conduits, channels and/or other members or features **3012**, **3042** that place such a source in fluid communication with the interior region, etc.) is configured to draw the skin surface toward the tip or other distal member to at least partially seal it against the peripheral lip. The creation of such a seal and the delivery of a vacuum force along the interior region **2023** defined by the peripheral lip **3022** can facilitate the delivery of fluid from the cartridge **3040** or other container to the tip **3020**. Further, the vacuum or suction force can cause skin located along the interior region **3023** of the tip or other distal member **3020** to be at least partially drawn within the interior region **3023** (e.g., toward the tip and the handpiece assembly). This can facilitate and/or enhance contact between the tip or other distal member **3020** and the skin surface being treated.

As noted above, in some arrangements, the creation of a vacuum or suction force along the interior region **3023** can advantageously permit enhanced fluid delivery from the cartridge or other fluid container **3040** to the tip or other distal member **3020**. The amount of suction generated can be adjusted to modulate this effect (e.g., to regulate the amount of fluid delivered to the tip, the rate at which the fluid is delivered to the tip, etc.). In some embodiments, the use and generation of vacuum along the tip also advantageously facilitates the removal of spent fluid and/or exfoliated skin from the tip or other distal member.

In some embodiments, the peripheral lip **3022** and/or other interior abrading member(s) and/or feature(s) of the tip and/or other distal portion or member **3020** of the assembly **3000** can be configured to at least partial abrading of tissue when the handpiece assembly is moved relative to a skin surface (e.g., especially when vacuum is being applied to the tip). In some arrangements, the tip or other distal member can include one or more abrasive features, surfaces and/or the like (for example, one or more abrading members, spiral members, posts, abrasive surfaces, abrasive pads, etc.) such that when the tip or other distal member is moved relative to a targeted skin surface (e.g., especially upon activation of a vacuum source that draws the tip toward and/or engaged with the targeted skin surface), at least portions of the targeted skin surface can be selectively abraded or otherwise removed. Further, in some embodiments, the abrasion members or features (e.g., spiral interior members) can facilitate the extraction of at least one of blackheads, sebum and/or any other substances from the skin (e.g., with the assistance of the application of vacuum, twisting and/or other actions, depending on the protocol). Such abrasive members or features can be incorporated into any embodiments disclosed herein or variations thereof. In other embodiments, the handpiece assembly of FIGS. **21A-21E** does not include any abrasive structures or features.

In some embodiments, the porous/wicking member **3080** positioned within the assembly **3000** is configured to at least partially contact the skin surface being treated during use. However, in other arrangements, as shown in FIG. **21C**, a small passage, opening or space **3060** is included between the distal end of the porous/wicking member **3060** and the interior region **3023** defined by the peripheral lip **3022** along the distal end of the tip or other distal member **3020**. Such a passage or opening **3060** can be sized, shaped and otherwise configured to deliver fluid (e.g., water, serums, other liquids or fluids, other materials, etc.) from the porous/wicking member **3080** to the distal end of the tip or other distal member **3020** during use (e.g., prior to and/or during the activation of vacuum). In some embodiments, two or more openings **3060** can be included to transfer fluids between the porous member **3080** and the interior region **3023** along the distal end of the tip. In yet other arrangements, a separate porous member or feature can be positioned between the porous member **3080** and the interior region **3023** to help regulate the passage of fluids to the distal end of the tip **3020**.

In any of the embodiments disclosed herein, the porous or wicking member **3080** can include one or more openings that extend through the porous/wicking member that are separate and different from the passageways inherently present in the porous structure itself. For example, such separate openings or passageways can extend at least partially longitudinally and/or radially along one or more portions of the porous member **3080**. In some embodiments, such openings or passageways can be configured to convey water or other fluids through the porous/wicking member at

a faster rate than through adjacent portions of the porous member. In some embodiments, such separate passageways can be configured to deliver air (e.g., continuously, intermittently, in a pulsed manner, etc.) to the skin surface. In other arrangements, the openings can be configured to deliver a separate fluid or other material (e.g., medicament, serum, other liquid or non-liquid material, etc.) to the skin surface during use. The diameter, shape, and orientation of the passageways and/or other openings can vary depending on the intended use, application and/or intended function or purpose, for example, to adjust the rate of flow of fluid or other substances through the porous/wicking member. In some embodiments, such passageways have a circular or curved cross-sectional shape. In some embodiments, they have an annular shape.

In some embodiments, one or more portions of the wicking or porous member **3080** can be at least partially hollow. In other arrangements, the porous member **3080** can be at least partially filled with substances, materials and/or structures, such as, for example, additional porous/wicking members having different properties than the first porous/wicking member, gels, solids, liquids and/or materials (e.g., either in loose form or in a contained manner, such as, in dissolvable or releasable capsules or other enclosures). In some embodiments, a porous member **3080** can include two or more passageways, other members and/or the like.

In some embodiments, as illustrated in FIG. **21C**, the porous member **3080** comprises an internal reservoir or region **3084** (e.g., a fibrous reservoir or portion). In some arrangements, the internal reservoir or region **3084** is positioned entirely within the porous/wicking member **3080**. However, in other arrangements, the internal reservoir or region **3084** is positioned adjacent to and/or at least partially external to the porous member **3080**. Regardless of its exact orientation, size, shape and/or other properties, the internal reservoir **3084** can include a flexible or other non-rigid design. For example, in some embodiments, the internal reservoir is at least partially filled with one or more felt materials and/or any other absorbent or semi-absorbent materials or features (e.g., sponge, sponge-like materials, cotton, cloth, fabric, porous foams, filters, etc.). In other embodiments, the internal reservoir **3084** is hollow or at least partially hollow. This can facilitate the passage of water or other liquids through those portions of the porous member **3080**.

According to some embodiments, the internal reservoir or region **3084** is configured to store or otherwise contain one or more treatment materials (e.g., in solid, gel, liquid and/or any other form) that are configured to at least partially dissolve or be released in the presence of water or other liquids. Thus, as water or other liquids are drawn from the cartridge or other container **3040** through the porous member **3080** (e.g., via the application of vacuum or suction), materials contained within the internal reservoir **3084** and/or within other portions of the porous member (e.g., the rigid or semi-rigid portions of the porous member **3080**) can be dissolved and carried to the tip-skin interface to enhance a treatment procedure. Such a configuration can simplify the manner in which serums and/or other treatment materials are delivered to the tip, can avoid having to store the treatment fluids within cartridges or other containers, can allow users to reuse cartridges and containers (e.g., by simply refilling them with water or another liquids) and/or provide additional benefits and advantages.

In some embodiments, the tip or other distal member **3020** is attached to the cartridge or other container by a press fit connection, friction fit connection, threaded connection,

other mechanical connection and/or the like. In some embodiments, as shown in FIGS. 21A-21E, the tip 3020 is connected directly to the container, and the handpiece assembly includes only the tip and container. But in other embodiments, additional portions can be included, e.g., a separate main body portion of the handpiece assembly that is configured to receive a cartridge or other container. For example, in some embodiments, the main body portion can include one or more interior and/or exterior recesses or other receiving areas or portions that are sized, shaped and otherwise configured to receive a cartridge or other container. Such arrangements can facilitate the fast and easy removal and replacement of containers. In some embodiments, the container can include a connection to a fluid manifold system.

In some embodiments, the porous or wicking member 3080 can be removable or replaceable and porous/wicking members with different properties (e.g., containing different materials) can be used. For example, porous members 3080 can be selected based on the materials they contain, their fluid transfer properties, other properties (e.g., absorbability, density, porosity, abrasiveness, etc.) and/or the like, as desired or required.

In some embodiments, the porous/wicking member 3080 is configured to contact skin tissue, for example, before or during use of the handpiece. In some arrangements, the porous/wicking member 3080 can include an abrasive structure or design (for example, one or more abrasive surfaces or features, such as, abrasive edges, members, etc.). In some embodiments, the tip or other distal portion of the porous/wicking member can include an abrasive surface or be otherwise configured to abrade tissue when the handpiece is moved relative to targeted skin tissue.

As noted herein, in some embodiments, positioning a porous member 3080 that is situated at least partially within a container (e.g., a cartridge) and extends to or near the distal end (e.g., to the tip) of the handpiece assembly 3000 can facilitate the transfer of fluids to the tip. In some embodiments, the transfer of fluids is enhanced by the use of porous materials or other structures (e.g., via capillary action), the generation of vacuum or suction along the tip and/or other factors.

FIG. 21E illustrates an exploded, perspective view of the handpiece assembly of FIGS. 21A-21D. As shown and discussed above, the porous or wicking member 3080 can be removable from the assembly 3000. In some embodiments, the porous member 3080 is configured to be removed (e.g., for disposal, replacement, etc.) by separating the tip 3020 from the container 3040. However, in other configurations, the porous member 3080 can be configured to be positioned into and/or removed from the handpiece assembly 3000 using a different method or procedure. As shown, the porous member 3080 can include one or more slots or recesses 3082 along one or more of its exterior surfaces. Such features 3082 can assist with properly aligning the porous member 3080 with and positioning the member 3080 relative to adjacent portions of the assembly 3000 (e.g., internal portions of the tip 3020 and/or the container 3040).

In some embodiments, as illustrated in FIGS. 22A-22E, one or more portions of the tip or other distal portion 3120 of the handpiece assembly 3100 can comprise one or more treatment materials 3190 that are configured to at least partially dissolve or otherwise release during use. For example, such materials can be embedded onto one or more surfaces, features (e.g., within cavities, posts or other abrasive members, etc.) of the tip, as desired or required. The embedded materials or other products 3190 positioned along

or near the tip 3120 can come in any form (e.g., solids, liquid, gel, powder, etc.). In some arrangements, the use of such materials 3190 on or near the tip 3120 can be in lieu of or in addition to the use of dissolvable or otherwise releasable materials within the porous/wicking member (not shown in FIGS. 22A-22E).

In any of the embodiments disclosed herein (e.g., the assemblies of FIGS. 21A-21E and 22A-22E), the tips and/or the porous members can include one or more dissolvable or releasable materials. Alternatively, such materials can be included in premixed (ready to use) liquids contained within the container or other cartridge 3040, 3140. Regardless, such materials can include, without limitation, skin tightening agents, platelet-rich plasma (PRP), exfoliation agents, peptides, bleaching agents, anti-acne agents, human growth factors, cytokines, soluble collagen, antioxidants, matrix proteins, Epicatechin, Catechin and/or other phenols and/or other anti-oxidants, neurotoxins, serums, salicylic acid, other anti-acne acids and materials, microcapsules, capsules, other time-release products and substances, water (e.g., distilled, tap water, filtered, etc.), saline, other dilution agents, dilutants or solvents, vitamins, chemical exfoliation agents, lotions, soothing agents, brightening or lightening agents, peptides, peeling agents, acids, anesthetics, medicants, other non-active or active compounds, other fluids or materials, combination or mixtures thereof and/or any other substance from one or more internal/external fluid sources.

For any of the embodiments disclosed herein, a cartridge or other fluid source configured to be used in an assembly (e.g., to couple to a handpiece), the cartridge can include two or more compartments that are fluidly isolated from one another. For example, in some arrangements, a cartridge includes two or three chambers, each of which is configured to store a different serum and/or treatment material to be used during a specific treatment procedure. In some embodiments, such a multi-compartment cartridge or other fluid source is separated by walls, baffles or other members or features. In some embodiments, a user can choose between the various compartments of the cartridge (and thus, the various serums and/or other materials to be delivered to the subject's skin surface) using one or more selection features, methods or devices. For example, the cartridge, handpiece, tip and/or other portion of the assembly can include one or more controllers (e.g., switches, levers, knobs, etc.) that permit a user to select the specific compartment of the cartridge from which fluids and/or other materials will be transferred to the subject's skin. In other embodiments, the orientation of the cartridge within the handpiece dictates which compartment will be in fluid communication with the assembly's internal passages and the tip. For example, the rotational or angular orientation of the cartridge relative to the handpiece can determine which compartment of the cartridge will be accessed by the rollerball.

In any of the assembly embodiments disclosed herein or variations thereof, the tip can be placed in fluid communication with a fluid manifold system. Thus, one or more fluids from such a manifold system or station can be selectively delivered to the assembly. Accordingly, in some embodiments, a dummy cartridge or a simple fluid conduit can be used (e.g. instead of a filled cartridge) to interface with such a manifold system or station.

According to certain embodiments, a cartridge or other container is placed in fluid communication with a manifold system that may comprise a plurality of individual fluid conduits. In turn, one or more of these fluid conduits can be in fluid communication with a separate container. For

example, in some embodiments, such fluid conduits can be in fluid communication with containers of a tower system. In one embodiment, the individual fluid lines are in fluid communication with a main fluid conduit, which connects to a nozzle along a proximal end of a cartridge or other container secured within the handpiece. One or more of the fluid conduits can comprise a valve or other flow control device or feature to selectively regulate the transfer of fluids and/or other materials to the assembly. In the some arrangements, the manifold system comprises a total of four fluid branches. However, a system can comprise more or fewer fluid branches (e.g., 1, 2, 3, 4, 5, 6, 7, 8, more than 8, etc.), as desired or required by a particular application or use. Additional details regarding a manifold system or tower are provided in U.S. patent application Ser. No. 11/392,348, filed on Mar. 29, 2006 and issued as U.S. Pat. No. 8,048,089 on Nov. 1, 2011, and PCT Application No. PCT/US2014/024992, filed on Mar. 12, 2014 and published as WO 2014/151104 on Sep. 25, 2014, the entireties of both of which are hereby incorporated by reference herein.

The systems, apparatuses, devices and/or other articles disclosed herein may be formed through any suitable means. The various methods and techniques described above provide a number of ways to carry out the inventions. Of course, it is to be understood that not necessarily all objectives or advantages described may be achieved in accordance with any particular embodiment described herein. Thus, for example, those skilled in the art will recognize that the methods may be performed in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other objectives or advantages as may be taught or suggested herein.

Although several embodiments and examples are disclosed herein, the present application extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the inventions and modifications and equivalents thereof. It is also contemplated that various combinations or subcombinations of the specific features and aspects of the embodiments may be made and still fall within the scope of the inventions. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combine with or substituted for one another in order to form varying modes of the disclosed inventions. Thus, it is intended that the scope of the present inventions herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow.

While the embodiments disclosed herein are susceptible to various modifications, and alternative forms, specific examples thereof have been shown in the drawings and are herein described in detail. It should be understood, however, that the inventions are not to be limited to the particular forms or methods disclosed, but, to the contrary, the inventions are to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the various embodiments described and the appended claims. Any methods disclosed herein need not be performed in the order recited. The methods disclosed herein include certain actions taken by a practitioner; however, they can also include any third-party instruction of those actions, either expressly or by implication. For example, actions such as “providing” include “instructing providing.” The ranges disclosed herein also encompass any and all overlap, sub-ranges, and combinations thereof. Language such as “up to,” “at least,” “greater than,” “less than,” “between,” and the like includes the number recited. Numbers preceded by a

term such as “about” or “approximately” include the recited numbers. For example, “about 10 mm” includes “10 mm.” Terms or phrases preceded by a term such as “substantially” include the recited term or phrase. For example, “substantially parallel” includes “parallel.”

What is claimed is:

1. A skin treatment assembly, comprising:

a tip comprising a proximal end and a distal end;

a container configured to secure to the tip along the proximal end of the tip, wherein the container is configured to contain a liquid;

a porous member configured to extend at least partially within an interior of the container such that it contact a liquid contained within the container, wherein the container comprises an outer wall, and wherein a spacing exists between an outside of the porous member and an inside of the outer wall of the container; and

at least one suction passageway that extends to or near the tip, wherein the at least one suction passageway is configured to be placed in fluid communication with a suction source to selectively create suction along the distal end of the tip;

wherein the porous member is configured to extend at least partially within an interior of the tip and is configured to facilitate the transfer of liquid from the container to the distal end of the tip; and

wherein the tip comprises at least one abrasive member or structure configured to at least partially abrade skin when the assembly is moved relative to skin tissue during a treatment procedure.

2. The assembly of claim 1, wherein the porous member comprises a wicking material.

3. The assembly of claim 1, wherein the porous member is removable and replaceable relative to the tip and the container.

4. The assembly of claim 1, wherein the porous member is rigid or semi-rigid.

5. The assembly of claim 1, wherein the porous member comprises at least one internal reservoir or region.

6. The assembly of claim 5, wherein the internal reservoir or region is configured to be at least partially hollow.

7. The assembly of claim 5, wherein the internal reservoir or region is configured to contain at least one flexible or other member.

8. The assembly of claim 7, wherein the at least one flexible or other member comprises a felt or another absorbent material or member.

9. The assembly of claim 5, wherein at least one treatment material is positioned within the internal reservoir or region, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid.

10. The assembly of claim 1, wherein at least one treatment material is positioned within the porous member, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid.

11. The assembly of claim 1, wherein at least one treatment material is positioned along or near the tip, wherein the at least one treatment material is configured to at least partially dissolve or release in the presence of a liquid.

12. The assembly of claim 1, wherein the at least one abrasive member or structure comprises at least one abrading member protruding distally toward the distal end of the tip.

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13. A skin treatment assembly, comprising:
 a tip comprising a proximal end and a distal end;
 a container configured to secure to the tip along the
 proximal end of the tip, wherein the container is
 configured to contain a liquid;
 a porous member configured to extend at least partially
 within an interior of the container such that it contact a
 liquid contained within the container, wherein the con-
 tainer comprises an outer wall, and wherein a space
 exists between an outside of the porous member and an
 inside of the outer wall of the container; and
 wherein the porous member is configured to extend at
 least partially within an interior of the tip and is
 configured to facilitate the transfer of liquid from the
 container to the distal end of the tip.

14. The assembly of claim 13, wherein the porous mem-
 ber comprises a wicking material.

15. The assembly of claim 13, wherein the porous mem-
 ber comprises at least one internal reservoir or region.

16. The assembly of claim 15, wherein the internal
 reservoir or region is configured to be at least partially
 hollow.

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17. The assembly of claim 15, wherein the internal
 reservoir or region is configured to contain at least one
 flexible or other member.

18. The assembly of claim 15, wherein at least one
 treatment material is positioned within the internal reservoir
 or region, wherein the at least one treatment material is
 configured to at least partially dissolve or release in the
 presence of a liquid.

19. The assembly of claim 13, wherein at least one
 treatment material is positioned within the porous member,
 wherein the at least one treatment material is configured to
 at least partially dissolve or release in the presence of a
 liquid.

20. The assembly of claim 13, wherein at least one
 treatment material is positioned along or near the tip,
 wherein the at least one treatment material is configured to
 at least partially dissolve or release in the presence of a
 liquid.

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